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2009 CLEANING AND DEMOLITION PROGRAM

AND

2009 INTERIM MEASURES WORK PLAN ADDENDUM

ASARCO EAST HELENA PLANT

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1.0 INTRODUCTION

1.1 OVERVIEW

Asarco LLC (Asarco) has prepared this 2009 Cleaning and Demolition Program and 2009 Interim Measures Work Plan Addendum (collectively referred to as the Work Plan) to fully describe the activities that will be implemented during calendar year 2009 at the East Helena Plant to address its obligations under the Montana Administrative Order on Consent (AOC). For work plans submitted pursuant to the AOC, Asarco shall describe the work, which constitutes above ground removal of hazardous wastes during the demolition of on-site structures. All other remaining engineered structures and ancillary equipment and all other remediation waste and contamination shall be addressed under terms of the RCRA Consent Decree (Decree). Accordingly, this Work Plan describes the measures that Asarco will undertake to fulfill the Decree's interim measure goals for conducting investigations or corrective actions that occur in connection with the scheduled activities. In recognition that implementation of the AOC obligations and Decree goals are linked, the Montana Department of Environmental Quality (MDEQ) and United States Environmental Protection Agency (EPA) have agreed that Asarco should prepare a single Work Plan for simultaneous approval.

1.1.1 Montana Administrative Order of Consent

Asarco and MDEQ entered into a 2005 Consent Decree, on February 15, 2005, to resolve alleged violations of the Montana Hazardous Waste Act (MHWA) and Administrative Rules

of Montana (ARM). The 2005 Consent Decree required Asarco to develop and implement yearly work plans designed to remove, store, and properly dispose or recycle all remaining hazardous waste and recyclable materials from identified process units located within Asarco's East Helena Plant. On October 2, 2007, Asarco and the MDEQ entered into a 2007 Administrative Order on Consent (AOC), which allows Asarco to continue with the cleanup processes established under the work plan provisions of the 2005 Consent Decree. The 2007 AOC requires Asarco to develop and implement yearly work plans for calendar years 2007-2012 to remove, store, and properly dispose or recycle all remaining hazardous waste and/or secondary material located in the process units, pollution control devices, and storage units and other identified areas of the facility. This Work Plan will accelerate the six-year schedule by completing Asarco's AOC obligations by the end of calendar year 2009. Asarco and the MDEQ developed Appendix A (Comprehensive List of All Process Units and Other Areas of Interest) as a guide to identify all areas to be addressed under the AOC.

1.1.2 RCRA Consent Decree

Asarco and the United States Environmental Protection Agency (EPA) entered into a Consent Decree (RCRA Consent Decree, U.S. District Court, 1998) to initiate the corrective action process in accordance with the Resource Conservation and Recovery Act (RCRA) and the Clean Water Act (CWA). With respect to this Work Plan, the Decree regulates certain investigation and/or corrective measures including 1) plugging and abandoning affected underground utilities, 2) collecting and analyzing demolition footprint exposed soils, 3) utilizing the CAMU Phase 2 Cell for hazardous waste management, and 4) placing and maintaining interim caps.

In 2008, Asarco submitted two separate Work Plans to the MDEQ and EPA for work scheduled for calendar year 2008. The procedures described in this Work Plan combine these past efforts by presenting a comprehensive program of the 2009 project components. Once approved by both MDEQ and EPA, Asarco intends to implement the tasks outlined in this Work Plan thought either a bid solicitation process or change order through Asarco's

existing demolition contract. Unless otherwise noted, the selected contractor will be responsible for the work contained in this Work Plan.

1.2 SITE LOCATION AND DESCRIPTION

The Asarco East Helena facility is a former lead smelter located on approximately 141 acres. The facility is surrounded by agricultural property on the west; Prickly Pear Creek and agricultural property on the east; Montana Highway 12 and residential properties to the north; and agricultural property to the south. Appendix B includes a site vicinity map (Sheet 1) and a site plot plan (Sheet 2). In 2008, Asarco constructed an on-site Corrective Action Management Unit (CAMU) Phase 2 Cell for the disposal of waste generated from cleaning and demolition activities at the East Helena Smelter Facility. The CAMU Phase 2 Cell location is shown on Sheet 1 in Appendix B.

1.3 PREVIOUS WORK

Throughout the last several years, Asarco has implemented work plans that describe the removing, storing, and disposal or recycling of hazardous waste or secondary material located in process units, pollution control devices, storage units, and other areas of interest. These areas are shown on Sheet 2 in Appendix B. The January 2009 Comprehensive List of Process Units and Other Areas of Interest (AOIs) (Appendix A) summarizes past cleaning efforts by describing the process unit's operational status, dates that cleanup activities occurred, and dates of MDEQ inspections. While MDEQ maintains a complete inventory of AOIs and their current cleanup status, it is recognized the Appendix A represents a similarly accurate record.

1.4 PROJECT DESCRIPTION

The buildings and structures addressed in this Work Plan have been categorized into either clean, clean prior to demolition, or demolish, as further outlined in the following table. The buildings, structures, and areas listed in Table 1-1 are illustrated on Sheet 2 (Appendix B).

TABLE 1-1. PROJECT BUILDINGS AND STRUCTURES

Clean	Clean Prior to Demolition	Demolish
o Hydrogen Peroxide Storage Tanks	o Sample Mill and Dust Loadout Baghouse	o Sample Mill
o High Grade Building	o Crushing Mill Baghouses	o Crushing Mill
o Truck Scale	o Sinter Stocking Building Baghouse	o Hopto Pad, Storage Bins, and Conveyor Gallery
o Locomotive Crane Shed	o Concentrate Storage and Handling Building Baghouses , Ventilation ductwork, and Stack Base	o Acid Dust Facility
o Cement and Dust Silos	o Hopto Pad, Storage Bins, and Conveyor Gallery	o Sinter Stocking Building
o Soda Ash and Lime Silo and Coke Hopper	o Acid Dust Facility	o Highline Railroad
o Pump House	o Groundwater Sump	o Abandoned and New Breaking Floor Buildings
o Storm Water Sump		o Groundwater Sump
o Direct Smelt Building		o CSHB Ventilation System and Stack
o Coverall Buildings		o Sinter Plant, Acid Plant, and Blast Furnace Stacks
o Adobe Shed		o Miscellaneous Railroad Ties
o Utility Support Towers		
o Concentrate Storage and Handling Building		

All of the buildings and structures listed in Table 1-1 with the exception of the high grade building, truck scale, pump house, direct smelt building, coverall buildings, adobe shed, and concentrate storage and handling building will be subject to pre-cleaning procedures as further described in Section 4.0 of this Work Plan. Pre-cleaning of these structures will not be necessary since they will continue to be utilized following Work Plan implementation. The buildings and structures highlighted in blue on Sheet 4 (Appendix B) are scheduled for cleaning and are further described in Section 5.0. The removal of hazardous waste from

these building and structures will be deemed complete when no process materials are visible. The buildings and structures highlighted in teal on Sheet 5 (Appendix B) are scheduled for cleaning prior to demolition. The buildings and structures highlighted in green on Sheet 6 (Appendix B) are scheduled for demolition and are further described in Section 6.0. Two stockpiles of used railroad ties are currently stored near the front entrance of the Asarco facility and on the slag pile. These ties highlighted in blue on Sheet 2 and 6 (Appendix B) are scheduled for placement in the CAMU Phase 2 Cell, as described in Section 6.0.

This Work Plan outlines the approach that shall be taken by Asarco and the contractor during all phases of the work. The sequencing of critical tasks prescribed in the Work Plan include:

- Development of the Work Plan,
- Simultaneous Approval of the Work Plan by MDEQ and EPA,
- New Demolition Contract or Change Order to Existing Demolition Contract,
- Pre-Construction Contractor Obligations (Section 2.0),
- Historic Survey and Recordation (Section 3.0),
- Pre-Cleaning Tasks (Section 4.0),
- Cleaning Tasks (Section 5.0),
- Demolition Tasks (Section 6.0),
- Waste and Recyclable Material Management (Section 7.0),
- Waste Hauling and Placement (Section 8.0),
- Waste Sampling and Analysis (Section 9.0),
- Final Cleaning (Section 10.0),
- Exposed Demolition Footprint Soil Sampling (Section 11.0),
- Plug and Abandon Underground Piping (Section 12.0),
- Capping of Demolition Areas (Section 13.0),
- Inspections of Interim Caps (Section 13.0),
- Demobilization and Contract Closeout (Section 14.0),
- Oversight of Project (Section 15.0), and
- Project Reporting (Section 16.0).

2.0 PRE-CONSTRUCTION CONTRACTOR OBLIGATIONS

Prior to the initiation of field operations, the contractor shall prepare, secure, establish, and/or conduct the following plans, permits, schedules, precautions, measures, facilities and/or meetings.

- Site-Specific Health and Safety Plan (HSP),
- Hazardous Materials Abatement Plan (HMAP),
- Recyclable Materials Plan (RMP),
- Dust Control Plan (DCP),
- Stack Demolition Plan (SDP),
- Community Relations Plan (CRP),
- NESHAP Permit,
- Construction Schedule,
- Storm Water Containment, Run-off Precautions, and Decontamination Water Management,
- Site Security Measures,
- Administrative, Staging, and Decontamination Facilities,
- General Construction Permits, and
- Pre-Construction Meeting.

The contractor shall follow all applicable federal, state, and local laws and regulations. Additional precautions not listed in this section may be required. The contractor shall be responsibility for determining which laws and regulations apply to the work being performed. The contractor will be responsible for coordination and scheduling of all tasks with Asarco's engineering consultant. Asarco reserves the right to stop all work at the contractors expense if the contractor doesn't meet either the obligations set forth in this Work Plan or the requirements set forth by the contractor in their approved HSP, HMAP, RMP, DCP, SDP, or CRP.

2.1 SITE-SPECIFIC HEALTH AND SAFETY PLAN (HSP)

The contractor shall develop a site-specific Health and Safety Plan (HSP) for review and approval by Asarco. The purpose of the plan shall be to protect personnel and the environment within the facility and the general public and environment in adjacent properties and neighborhoods. One of the many critical components of the HSP shall include conducting tailgate safety meetings at the beginning of every work shift, during new phases of operation, when new personnel are introduced to the site, and when site conditions warrant such meetings. These meetings shall identify potential workplace hazards and problems so that appropriate control measures can be implemented. The HSP shall establish procedures and address emergencies that may arise during all site activities. Emergency vehicular access, evacuation procedures, and a listing of all contract personnel with phone numbers shall be included in the HSP.

The site-specific HSP shall describe the contractors procedures to enforce the plans elements and protocols within the site facility and boundaries at all times. The contractor's Health and Safety Officer shall identify the detailed, specific health and safety issues related to the process units and material handling areas within the facility and be responsible for enforcing the contractors HSP.

This Work Plan requires employees of the contractor and/or subcontractor to be certified to participate in abatement and environmental activities. Employee certifications will be kept on file in the contractor's project field office. The contractor shall meet at a minimum the employee environmental health, safety training, and biological evaluation minimum requirements listed in Table 2-1.

TABLE 2-1. WORKER HEALTH EVALUATIONS AND SAFETY REQUIREMENTS

Type	Required Health Evaluations and Safety Training	General Work Tasks
GROUP A	None	General Work Force -- Outside Facility
GROUP B	40 Hr – HAZWOPER - OSHA OSHA Lead, Arsenic, and Cadmium Standard Blood Lead Tests Full Physical Respirator Fit Test Site Specific Training	General Work Force --Within Facility All Workers Within Facility or at CAMU site
GROUP C	40 Hr – HAZWOPER-OSHA Blood Lead Tests OSHA Lead, Arsenic, and Cadmium Standard Full Physical Respirator Fit Test Site Specific Training Asbestos - 8 Hr Worker Awareness OSHA	Asbestos Abatement Workers

Workers participating in general work tasks outside of the Asarco East Helena Plant facility require no special health evaluation or safety training, as outlined under Group A in Table 2-1. Workers participating in any task within the Asarco East Helena Plant facility, including all CAMU Phase 2 Cell tasks, require the specified health evaluations and safetytraining, as outlined under Group B in Table 2-1. Workers conducting asbestos containing material (ACM) abatement activities shall require additional safety training, as outlined under Group C on Table 2-1. Table 2-2 lists the tasks that shall be performed during implementation of the 2009 Work Plan and the associated health evaluation and safety training. All personnel conducting work associated with a task shall meet the health and safety requirements for the specific task.

TABLE 2-2. HEALTH EVALUATION AND SAFETY REQUIREMENTS ASSOCIATED WITH 2009 WORK PLAN TASKS

Tasks for 2009 Work Plan	Required Health Evaluation and Safety Training
Mobilization and set-up field office and related facilities	Group A
Pre-Cleaning	Group B
Pre-Cleaning ACM Abatement	Group C
Cleaning	Group B
Historic Survey and Recordation	Group B
Demolition	Group B
Waste Hauling and Placement	Group B
Waste Sampling and Analysis	Group B
Final CAMU Cover System	Group B
Final Cleaning	Group B
Exposed Soil Sampling	Group B
Plug and Abandon Underground Utilities	Group B
Interim Capping	Group B
Demobilization and Contract Close-out (Within facility)	Group B
Demobilization and Contract Close-out (Outside facility)	Group A
Project Oversight	Group B

2.2 HAZARDOUS MATERIALS ABATEMENT PLAN (HMAP)

The contractor shall develop a site-specific Hazardous Materials Abatement Plan (HMAP) for review and approval by Asarco. The purpose of the HMAP shall be the protection of personnel and the environment on-site, as well as the general public and environment in adjacent properties and neighborhoods. The components of the HMAP shall include, at a minimum, a 1) asbestos containing material (ACM) abatement plan, 2) used oil and liquid management plan, 3) universal waste management plan, 4) non-PCB and PCB light ballast management plan, and 5) refrigerant (freon) management plan. The contractor's HMAP shall fully describe the manner in which these materials shall be managed to ensure a safe working environment for their employees and adhere to all state and federal regulations. The HMAP shall be enforced within site boundaries at all times.

2.2.1 Asbestos containing material (ACM) Abatement

Materials located within the facility considered for ACM abatement include, but are not limited to rope, tile, mastics, transite siding and panels, window putty, roofing materials, and metal panels. The licensed contractor shall perform the ACM abatement activities according to the procedures contained in the contractor's HMAP.

ACM abatement activities to be performed consist of the removal of ACM from affected building and structures. In 2007, Asarco contracted with IRS Environmental to conduct a site-wide ACM survey of the East Helena facility, a copy of which shall be provided to the contractor. Based on this survey and past ACM abatement actions, limited amounts of ACM remain within the facility. The abandoned breaking floor building is one of the structures in which ACM is known to be present. A map illustrating buildings that have been surveyed for ACM is included on Sheet 3 in Appendix B. This map and the IRS Environmental ACM survey shall be considered as a reference, only. The contractor shall be responsible for identifying and removing all ACM. Since an ACM survey has not been conducted on the all structures affected by this Work Plan (such as the acid dust loading building), the contractor shall perform the necessary supplemental ACM survey and, if applicable, perform ACM abatement activities. If, during the course of implementing the Work Plan, additional previously unknown ACM is discovered, the contractor shall utilize the methods and procedures as described in the HMAP for ACM management.

ACM subject for removal under the Work Plan that are judged by a competent person to be friable (i.e., ACM that, when dry, can be crushed, crumbled, pulverized, or otherwise rendered to a dust by hand pressure) shall be containerized in a manner to prevent release of ACM material. Non-friable asbestos materials, such as ACM transite siding, do not require special containerization.

The contractor shall assemble and submit the required notifications to the MDEQ before beginning ACM abatement work. The contractor shall copy Asarco with all submittals.

The contractor shall post and display danger signs meeting the specifications of OSHA Construction Safety Order, Section 1529 and WAC 296-62-077 at any locations and approaches where regulated areas are present. The signs shall be posted at a distance sufficiently far enough away from the work areas to permit any employee or visitor to read the sign and take the necessary protective measures to avoid exposure. The warning signs shall include, at a minimum, the following wording:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

These warning signs shall be printed in letters of sufficient size to be clearly legible. In addition, two strips of red "DANGER ASBESTOS – DO NOT ENTER" tape shall be used to restrict access by untrained personnel.

The contractor shall be responsible for providing adequate power at each of the buildings where ACM abatement is being preformed. The contractor shall provide temporary lighting sources and ensure safe installations (including ground faulting) of temporary power sources and equipment by complying with all applicable electrical code requirements and OSHA requirements for temporary electrical systems.

The contractor shall ensure that ACM is transported to the CAMU Phase 2 Cell for disposal following the same procedures for waste transport as described in Section 8.0. ACM will be weighed by Asarco's engineering consultant prior to placement in the CAMU Phase 2 Cell. ACM will not be sampled or further characterized before being placed in the CAMU Phase 2 Cell. Asarco's engineering consultant will define the location where ACM are placed in the CAMU Phase 2 Cell and will survey and record this location.

2.2.2 Used Oil and Liquid Management

The contractor shall identify all equipment located within buildings and structures affected by the Work Plan that may contain used oils or other liquids. The contractor shall locate and coordinate the removal of all such oils and liquids prior to commencing any demolition. The contractor may utilize mechanical (metal or plastic) hand pumps or vacuum devices to facilitate oil and other liquid removal. Hand pumps, if used, shall pump the oil or other liquid directly into 55-gallon drums. Drums shall be located adjacent to the work area during oil or liquid transfer to reduce spillage. Once filled, the drum will be sealed and labeled (Section 7.3) with the type of substance. Absorbent shall be available on-site during oil and liquid removal and transfer as a contingency in case of spillage. Used absorbent shall be placed in a drum labeled "Oily Absorbent". The contractor shall promptly clean up oil and grease spills to prevent contamination of storm water and/or run-off. All storage containers shall be relocated by the contractor to the shop storage building. The contractor shall notify Asarco when such relocations take place. Asarco will be responsible for inspection and management of used oils and liquids once they are placed into storage.

2.2.3 Universal Waste (UW) Management

Universal Waste (UW) items shall require special handling and management. UW items that may be encountered during the implementation of the Work Plan include lamps and mercury containing equipment. UW lamps include fluorescent, high intensity discharge, neon, mercury vapor, high-pressure sodium, and metal halide lamps. UW mercury containing equipment includes thermostats that contain metallic mercury in an enclosed ampule. The contractor shall identify all UW lamps within or around the buildings and structures affected by the Work Plan. The contractor shall locate and coordinate the removal of all such lamps prior to commencing any demolition. The contractor shall ensure that all electrical systems have been de-energized before personnel begin removal of the UW lamps. The plastic cover of the light fixture, if present, will be removed and placed on a secure surface, at which time the exposed UW lamps will be removed by hand and placed in an appropriate container for storage. The contractor may utilize rolling scaffolding, man lifts, or ladders to support workers on single story floors. For ceilings or outside locations that are of greater height, a

motorized boom-lift may be utilized to assist in retrieving UW lamps and other lighting components.

The contractor shall identify all UW mercury containing equipment within or around the buildings and structures affected by the Work Plan. The contractor shall locate and coordinate the removal of all such mercury containing equipment prior to commencing any demolition. Each identified piece of mercury containing equipment designated for removal will be isolated and cleared of all obstructions. Disconnection of the isolated items will proceed utilizing all safety and standard removal procedures for the specific item. Procedures will include lockout/tagout of electrical feed to buildings or areas, cutting electrical lines to the unit, and removing isolated items. The removed mercury containing equipment shall be placed in a 5-gallon spill proof plastic container containing several inches of absorbent media. This media will cushion the ampules during facility transportation as well as absorb any free-flowing mercury if ampules were to break or leak. In case of a spill or release, contractor personnel involved in the removal and handling of mercury containing equipment shall utilize a Mercury Spill Response Kit. All storage containers shall be relocated to a designated temporary storage area. Asarco shall be notified when such relocations take place. The contractor should anticipate using the shop storage building for the storage of mercury containing equipment. Asarco will be responsible for inspection and management of UW placed into storage.

2.2.4 Non-PCB and PCB Light Ballasts Management

The contractor shall be responsible for identifying and removal of non-PCB and PCB light ballasts prior to commencing demolition. After removal of fluorescent light tubes, the protective ballast cover shall be removed to access the light ballast. The light ballast inspection may be completed with the fixture in place. The inspection of the light ballast shall include careful review of the ballast label to determine if the ballast contains PCBs. If the ballast is not marked “No PCBs” or the label is removed or unreadable, the ballast shall be assumed to contain PCBs. If the ballast does not contain PCBs, as determined by this definitive visual inspection, the non-PCB ballast will be left in place for demolition.

During removal of the ballast, if any portion of the light fixture is impacted with PCB oil, the portion of the impacted fixture may be decontaminated by scraping the oil from the ballast cover. Any generated residue or wiping clothes will be considered PCB contaminated and incorporated into the drummed ballast waste stream. All PCB storage containers shall be relocated to a designated temporary storage area. Asarco shall be notified when such relocations take place. The contractor should anticipate using the shop storage building for the storage of mercury containing equipment. Asarco will be responsible for inspection and management of the PCB items placed into storage.

2.2.5 Refrigerant (Freon) Management

Under the 2007 Cleaning and Demolition Work Plan, air conditioning Freon from heating and cooling units within the inactive buildings and structures at the East Helena facility was removed. These heating and cooling units have been marked with a painted yellow stripe. The contractor shall be responsible for identifying and removal of any Freon from remaining building and structures prior to commencing demolition. The Freon containing equipment shall be disconnected utilizing the proper safety and standard removal procedures and evacuated. Air conditioners and chillers shall be disconnected from their power sources. The contractor shall utilize a certified refrigerant recovery subcontractor to facilitate evacuation and recovery of the refrigerant. The contractor shall document on an internal removal log, the quantity in pounds of Freon recovered from the various units. Asarco shall be provided with a copy of the log. Once the unit is cleared, the unit shall will be tagged with an agreed upon colored tag indicating "Freon Removed." The contractor will be responsible for arranging for the recycling of the removed Freon.

2.3 RECYCLABLE MATERIAL PLAN (RMP)

During the demolition phase of the Work Plan, the contractor will likely encounter certain materials or equipment (scrap steel, copper, motors, pumps…) that may be recycled. Asarco encourages the recycling and recovery of these valuable material assets. The contractor shall develop a Recycling Material Plan (RMP) for review and approval by Asarco. The plan shall include a description of the types of recycle material that the contractor considers valuable. The techniques for segregating recyclable material from waste (including decontamination

procedures), manner for transporting to the recycling facility, tracking of recyclable material, and inspection procedures shall be included in the RMP. The contractor shall establish recyclable material staging and loading areas. These areas shall be easily accessible to expedite loading and transport activities. Surface cover in these areas shall be durable enough to withstand the storage and movement of heavy scrap material without breaking apart and creating difficulties when loading the material or impacting the areas. The contractor shall provide records to Asarco that indicate the manner in which recyclable material is managed, handled, or treated for recovery or recycling that demonstrates it's value. The contractor shall submit 1) acceptance criteria required by the receiving facility (expressed as a minimum threshold of recoverable metals and maximum allowable toxic metals), 2) a demonstration that the receiving facility is in compliance with all applicable environmental requirements, 3) a copy of the contractual agreement between Asarco, its broker and the receiving facility, and 4) the name of the state or provincial regulatory contact and facility contact.

2.4 DUST CONTROL PLAN (DCP)

The contractor shall develop a Dust Control Plan (DCP) for review and approval by Asarco. The general requirements of this plan shall be to provide adequate resources to control dust and to detail the means and methods that shall be utilized to implement dust control measures during Work Plan activities. The contractor's dust control measures shall be designed to control the emission of visible fugitive nuisance dust. These controls shall be accomplished through the use of administrative, engineering, and physical controls that shall include, but not be limited to:

- Moistening surfaces with water,
- Applying dust suppressants or encapsulates, where applicable,
- Minimizing soil, road, and surface disturbances,
- Minimizing dust exposure periods and wind erosion before dust-abatement measures are applied,
- Utilizing a vacuum sweeper to remove road dust spillage,

- Curtailing of work activities during high wind conditions (over 15 MPH average hourly rate),
- Controlling vehicle and equipment speeds (10 MPH maximum),
- Restricting traffic to designated roads and corridors, and
- Selecting appropriate equipment.

The contractor shall utilize an overall dust control application program that shall include, but not limited to:

- Providing dust suppression (water) before, during, and after demolition of a structure,
- Moistening the targeted drop area prior to the demolition of the structure,
- Installing protective barriers to minimize debris shrapnel during demolition of structures,
- Providing dust control during material sizing and loading operations,
- Controlling material drop heights during loading, unloading and material transfer operations,
- Minimizing and controlling material handling operations,
- Controlling on-site vehicular traffic and performing haul road maintenance, and
- Applying other approved methods for control of dust during specific procedures.

The contractor shall consider the mitigation of airborne dust generation a priority. Throughout the project, the contractor shall execute all necessary steps to effectively control dust in the working area during Work Plan activities. Asarco reserves the right to stop all work if Asarco personnel or the Asarco engineering consultant believe the contractor is not meeting the obligations of their DCP. The contractor shall remove at ground level and at all accessible areas all gross debris accumulation that could be a source of airborne dust. Prior to demolition, the contractor shall institute a program of pre-wetting and moistening building interiors and horizontal surfaces where dust has accumulated. This pre-wetting of the structure interiors will minimize remaining dust from becoming airborne during the

demolition process. Dust that may fall to the ground shall be gathered, containerized, and properly managed.

The contractor shall utilize water trucks, misting systems, and all other appropriate equipment (i.e. manlifts) to keep debris moist during the demolition and loading process. The DCP shall outline the dust control measures during stack demolition, including the prohibition of stack demolition if wind conditions exceed 5 mph. All transport vehicles shall be limited to a maximum 10 miles per hour while both on-site and during transport. Limiting speeds shall prevent dust from become airborne during transport and shall reduce the kick-up of dust from rolling tire action.

The contractor shall ensure that transport of waste on-site occurs on prescribed paths, which will be determined during the course of demolition. The changing nature of the site as demolition of structures progress may dictate the modifications of haul routes. Once defined, these haul routes shall be enforced to create dedicated routes that can be maintained to mitigate dust and debris migration and prevent any potential spread of contamination. The contractor shall be responsible for maintenance of haul routes through routine daily inspection to ensure that debris is not being released. The Contractor shall promptly address all deviations encountered during daily inspections.

The contractor shall lightly dampen haul routes with a water truck on a frequency to prevent the generation of dust. The facility's air quality permit requires the use of dust suppression methods, including the use of water, to meet this obligation. The use of water as a dust suppression shall be managed to minimize infiltration. The temperatures and relative humidity experienced during the construction season will promote evaporation of the water used for dust suppression rather than infiltration. Street sweepers or a vacuum truck shall be used on plant site and waste transport haul roads. Water dust suppression can augment the constant use of street sweepers or vacuum trucks. The contractor shall utilize the services of a street sweeper to clean the haul routes of accumulated debris and dust. This debris and dust sweepings will be hauled to the CAMU Phase 2 Cell.

Haul roads within the plant site and haul roads used for waste transport will need to be kept clean at all times. A street sweeper designated to cleaning roads and surfaces within the plant site will clean all loose dust in order to minimize the chances for the off-site migration of dust and debris. This street sweeper will not be used off site of the plant. A second street sweeper designated to keeping CAMU Phase 2 Cell haul roads clean will be run constantly when waste is being hauled. Haul roads at the CAMU Phase 2 Cell have been paved so that waste and debris can easily be cleaned. In addition, the contractor shall place and maintain large gravel on a section of the haul route at the plant exit and CAMU exit to remove loose dust and debris from haul truck tires. Once hauling of waste is complete, the contractor will place this gravel material in the CAMU Phase 2 Cell. The DCP shall also address a plan for the application of a dust suppressant or binder on waste in the CAMU Phase 2 Cell. The application of a dust suppressant or binder may be necessary if fugitive dust emissions from the CAMU Phase 2 Cell occur, or the CAMU Phase 2 Cell is left open for an extended period of time due to construction or demolition delays.

The DCP shall indicate that the existing Asarco provided fill station, adjacent to Upper Lake, be utilized as the main source of non-potable water for dust suppression operations. The fill station water source used for dust suppression is Upper Lake.

The contractor project staff (i.e., project superintendent, foremen, H&SP) shall inspect work areas daily to assess the need for implementation (or additional implementation) of dust control measures. The contractor shall include inspection procedures and recordation within the DCP.

2.5 STACK DEMOLITION PLAN (SDP)

The contractor shall develop a Stack Demolition Plan (SDP) for review and approval by Asarco. The SDP shall describe the means and methods for demolition of the blast furnace, sinter plant, acid plant, and concentrate storage and handling building stacks. The SDP shall include stack demolition procedures and protocol, worker and public health and safety measures, and actions that shall be taken to control the emission of dust, as further detailed in

the DCP. The contractor shall be responsible for coordination of stack demolition activities with other Asarco contractors, the Asarco engineering consultant, and the Federal Aviation Administration (FAA).

The SDP shall ensure that all demolition debris is contained within the Asarco East Helena facility. No stack debris, regardless of size, shall cross the fence line or the boundary into Upper Lake or Lower Lake. The SDP shall contain protocol to protect existing structures, existing wells, and the existing interim temporary cover system.

The SDP shall contain provisions for conducting a pre-blast survey by an independent firm hired by the contractor to verify that the surrounding structures are not affected by the demolition (blast) activities. Seismographs shall be placed at various locations surrounding the blast site to verify that blast vibration does not exceed prescribed values. The estimated peak particle velocity should be less than 0.25 inches/ second at a 500-foot radius from the stacks. The initiation system shall be a non-electric system to provide a higher factor of safety and eliminate premature detonation by lightning or radio interference.

The contractor shall establish a secure area around the site. All site security shall be coordinated between Asarco, the contractor, and the local authorities. The SDP and Community Relations Plan (Section 2.6) shall identify all lines of communication between local authorities and the contractor prior to stack demolition.

2.6 COMMUNITY RELATIONS PLAN (CRP)

The contractor shall develop a Community Relations Plan (CRP) for review and approval by Asarco. At a minimum, the CRP shall specify the manner for notifying, communicating, and securing the site with Asarco, MDEQ, EPA, local law enforcement authorities, the city of East Helena, Lewis and Clark County, media, and the local community throughout demolition activities.

2.7 NESHAP PERMIT

The contractor shall obtain the applicable National Emissions Standard for Hazardous Air Pollutants (NESHAP) Permit. This permit is required for both asbestos abatement activities and demolition activities. The contractor shall communicate directly with the MDEQ to obtain the permit and shall present the executed permit to Asarco prior to mobilization.

2.8 CONSTRUCTION SCHEDULE

The contractor shall prepare a detailed construction schedule that includes, at a minimum, durations and milestones for Work Plan activities. The schedule shall provide sufficient detail to define the path of the project and include time for delays from inclimate weather. Throughout the project, the schedule shall be regularly updated to reflect current conditions. The contractor will provide all schedules to Asarco, the MDEQ, and EPA.

2.9 STORM WATER CONTAINMENT, RUN-OFF PATTERNS, AND WATER MANAGEMENT

The contractor should rely upon the Asarco East Helena facility's existing Storm Water Prevention Plan (SWPPP) for this scope of work. This SWPPP describes storm water prevention procedures to be utilized during the Work Plan. In general, facility storm water runoff is routed to the internal plant water handling system. Storm water and run-off will be directed to the High Density Sludge (HDS) water treatment facility (WTF) to be operated by Asarco personnel. The contractor will be responsible for the separation of solids and liquids from all water used by the contractor during the implementation of this Work Plan. The contractor will need to remove solids from water reporting to the WTF, dry solids, and place dry solids in the CAMU Phase 2 Cell.

In areas where cleaning and/or demolition could potentially create runoff, the contractor shall protect the drains as necessary to prevent contaminants from entering the system. This protection shall consist of a combination of sand bags, hay bales, and filter fabric strategically placed to remove the solids while allowing the storm water and/or run-off to continue to the existing storm water containment and treatment system. The contractor shall

ensure storm water and run-off is free of grease and oils by utilizing methods to prevent and promptly clean any oil and grease spills. The contractor will be responsible for ensuring that the existing storm water containment and treatment system is not impaired and in proper working order upon completion of Work Plan activities.

The contractor shall utilize Best Management Practices (BMPs) throughout the Work Plan implementation. From the existing SWPPP, applicable information, such as management practices for the hazardous material storage areas, shall be incorporated into the contractor's Best Management Practices. Other material handling practices related specifically to the decontamination and demolition activities shall be addressed. Management practices for cross-contamination control shall be addressed, such as avoiding spills from construction vehicles during hauling, loading, servicing, and fueling and controlling contaminated soil erosion. Any changes to the storm drainage system due to demolition will be addressed as the structures are demolished and the site conditions change.

Standard erosion control measures shall be utilized, including controlling dust, providing straw bales around storm drain inlets, placing sand-bags at critical perimeter locations, and avoiding off-site tracking of debris from vehicles. Provisions to avoid ponding and maintain excavations free of storm water runoff shall be addressed. Typically, this will involve filling these locations prior to storms. Measures for erosion control shall be added as the project progresses.

The contractor shall perform inspection of the erosion control measures prior to, during, and after storms to evaluate the adequacy of these measures and to manage corrections as necessary. Documentation of the inspection and correction activities shall be maintained, as required. Generally, the contractor's project manager or engineer shall perform the inspection and documentation. Copies of the documentation shall be forwarded to Asarco for review and record retention.

Existing collection trenches and sumps shall be used to collect surface water during Work Plan implementation. The locations of these trenches and sumps will be confirmed and identified by the contractor, utilizing existing project utility plans and plant engineering drawings, during the pre-mobilization activities as well as throughout the completion of Work Plan. During collection of surface water, water will be directed to Asarco's WTF for treatment. Asarco shall manage all collected surface water run-off in the WTF. Asarco shall be responsible for any required water treatment, waste management, and disposal permits associated with the WTF. The contractor shall be responsible for maintaining and cleaning existing storm water collection trenches and sumps.

The conveyance systems used to collect project decontamination water will include, but not limited to those features generally located in the vicinity of Asarco's wastewater treatment and the on-site car wash facilities. The East Helena Plant WTF treats facility water and discharges the treated water under Asarco's MPDES permit. The sludges that collect in sumps, defined as wastewater treatment units (40 CFR 260.10), are exempt from RCRA permitting. When generated by removal from the sumps, the sludges will be managed appropriately and, if hazardous, will be managed in accordance with applicable rules and regulations.

Asarco's current MPDES permit, March 2001 MPDES permit renewal application, and April 2007 update to its March 2001 MPDES permit renewal application (MDEQ action pending) list Upper Lake and City of East Helena water as operations contributing flow to Asarco's WTF effluent, both of which may be used for decontamination of project equipment. The MPDES permit allowed for the treatment of decontamination equipment wash water during plant operations. The MPDES permit provides for this same treatment during the cleaning and demolition activities.

2.10 SITE SECURITY

The contractor shall establish a site security plan for review and approval by Asarco. The contractor shall be responsible for all facets of site security during implementation of the

Work Plan. The facility is currently surrounded by security fencing or structures, which will prevent unauthorized personnel access to the site. The contractor shall establish work hours in consultation with Asarco. The contractor shall follow sign-in procedures and check in at the main facility gate or another gate/entrance specified. The contractor shall control access to work areas during operating hours through the monitoring of a single ingress/egress location with mandatory sign-in procedures for all contractor personnel. During off-hours, sensitive work areas (open ditches, channels, and holes) shall be cordoned off with temporary barricades, delineators and caution tape. The contractor shall coordinate with community leaders, local authorities, law enforcement officials, and private owners to restrict public access to the facility during all phases of the Work Plan. The contractor may be required to close public right-of ways, county roads, and rail corridors; establish exclusion zones; and control public and media viewing.

2.11 ADMINISTRATIVE, STAGING, AND DECONTAMINATION FACILITIES

The contractor shall establish and utilize temporary facilities and construction control procedures throughout the Work Plan. Asarco will make available, and the contractor will maintain, temporary office space to coordinate field construction activities. The contractor shall provide adequate sanitary facilities, fences, barricades and scaffolding. Storage for tools, light equipment and appropriate signs shall be established, as needed, for this project. Temporary services shall be coordinated with Asarco for Work Plan activities and site traffic. Safety shall be managed, including the monitoring of vehicular and pedestrian traffic and public safety, as needed.

The contractor shall establish work zones during pre-mobilization planning. In general, this planning shall include:

- Lead and decontamination exclusion areas,
- ACM removal areas,
- Equipment staging areas,
- Personnel decontamination areas,
- Storage areas,

- Demolition and material salvage areas,
- Loading areas and staging of off-site waste, and
- Field office and support areas.

2.12 GENERAL CONSTRUCTION PERMITTING

The following list identifies the applicable permits and/or notification that may be obtained or the agencies that may need to be notified by the contractor prior to the initiation of any fieldwork.

- Montana Department of Environmental Quality (MDEQ).
- Environmental Protection Agency (EPA).
- Division of Occupational Safety and Health (OSHA) Department of Industrial Relations - Notification of Asbestos Abatement.
- Division of Occupational Safety and Health (OSHA) Department of Industrial Relations - Notification of Demolition Activity S-691.
- Montana Rail Link.
- Lewis and Clark County Sheriff.
- City of East Helena Police Department.
- Montana Highway Patrol.

2.13 PRE-CONSTRUCTION MEETING

Following the completion of the pre-construction contractor tasks outlined above, a pre-construction meeting shall be held at the facility or other location designated by Asarco. The purpose of the meeting will be to discuss the scope of work and the roles of the parties involved. Details regarding the date that fieldwork will be initiated, site access requirements, hours of operation, deliverables required by Asarco, and locations of construction equipment, staging and cleaning areas should be discussed. Participants in the meeting shall include the Asarco project team, Asarco's engineering consultant project team, the contractor's project team, the MDEQ, and EPA.

2.14 MOBILIZATION

Following the pre-construction meeting, work areas shall be secured and a central field office shall be established. Equipment and materials necessary to complete the project shall be moved to the facility and staged at predetermined locations within the facility. In addition to the field office, the following work areas shall be established:

- Establishment of on-site electric and water service (as needed),
- Personnel decontamination areas,
- Temporary conveyance systems,
- Equipment lay down areas, and
- Demolition salvage staging and loading areas.

The contractor shall establish personnel decontamination areas for each exclusion zone and work activities that may expose workers to unique safety hazards and/or hazardous levels of chemicals and waste materials. These requirements shall be used to determine appropriate personnel protective equipment (PPE) that will be used in each of the separate plant areas during each phase of work. Required PPE, decontamination procedures, and personnel decontamination equipment shall be identified in the contractors HSP and HMAP.

3.0 HISTORIC SURVEY AND RECORDATION

Asarco shall contract an engineering consultant to conduct historic recordation of the demolition structures and buildings identified in the Work Plan. The proposed demolition focuses twelve structures with associated features anticipated to be impacted by the project. No demolition activities will commence on structures listed in the section until the photographic documentation is complete and notice to proceed is received by MDEQ and EPA. In conjunction with EPA, the Montana State Historic Preservation Office (SHPO), and MDEQ, Asarco's engineering consultant shall define the requirements for historic recordation of the twelve structures and associated features. These obligations are:

- Provide a plan map of the facility indicating photograph numbers, photograph locations, and cardinal directions of each photograph taken.
- Provide photographs and a photographic log of each structure.
- Provide drawings and plans for each structure.
- Provide video documentation of the demolition of the three stacks.
- Provide a context narrative,.
- Provide Cultural Resources Information System (CRIS) Forms.
- Provide archival quality 5 by 7 inch prints and photograph log of each structure.

The structures identified for cleaning and demolition during 2009 include:

1. Sample mill,
2. Crushing mill and associated baghouses,
3. Hopto pad, storage bins, and conveyor gallery,
4. Sinter stockpile building,
5. Highline railroad,
6. Groundwater sump,
7. Abandoned and new breaking floors,
8. Acid dust facility,
9. CSHB ventilation system and stack,
10. Sinter plant stack,
11. Acid plant stack, and
12. Blast furnace stack.

3.1 PLAN MAP

A plan map of the facility will be created using Asarco's engineering drawing 08-01-7806. Building names will be cross-referenced to the demolition plan map. Based on discussions with personnel from the State Historic Preservation Office during the work performed in 2008, all buildings will be recorded and photographed. There will be no effort to separate the recordation approach based on the age of the structure.

3.2 PHOTOGRAPHIC DOCUMENTATION

National Register format coding information for the photo record shall be utilized to document each photo number, the location where the photo was taken, and the direction of photo. At least one (1) representative photograph shall be taken of each target building. Older buildings and buildings with potential architectural significance (because of uniqueness of design or function) shall have additional photos taken. The number of photographs shall be adjusted to capture the building's integrity of design and function to assess significance. The photo log shall provide the specifics of each shot and shall include the orientation of the

photograph, field notes taken during the photography effort, and other details regarding each photograph.

3.3 VIDEOGRAPHIC DOCUMENTATION

To comply with SHPO's requirement that the demolition of the sinter plant stack, acid plant stack, and blast furnace stack be videotaped, Asarco proposes to develop a professionally produced documentary of these historic events. The approximately 10-minute-long program shall provide a brief history of the smelter, as well as subsequent events culminating in the demolition itself. After establishing the context, most of the film shall focus on the preparations for an event that will inevitably be of interest not only to industrial historians and regulatory officials, but to the local community and the entire state of Montana. The documentation anticipates interviews with state and local officials, along with the demolition contractors, who shall describe the technical details of the demolition. These would include the overall plan for the demolition, how the charges are laid in order to control the collapse of the stacks, and other pertinent details. The interviews shall be accompanied by carefully interwoven shots of workers making the preparations to ensure that the stacks come down exactly as planned. The documentary team shall work closely with the demolition contractor so that the entire process, from planning to implosion, is shot from the best angles to present these historic events from the best possible vantage points. The finished documentary shall be presented on high quality DVD for archival preservation. The actual tape plus two DVDs shall be submitted to SHPO. A DVD will be provided to both the MDEQ and to EPA.

3.4 DRAWINGS AND PLANS

The search for engineering drawings shall include a search of records currently maintained in the East Helena Smelter Engineering Office, and/or corporate headquarters and/or storage facilities in Arizona. All engineering drawings and plans shall be electronically scanned and provided to SHPO. A spreadsheet of drawing titles and jpg delineators shall be developed as an index to the scanned documents.

3.5 CONTEXT NARRATIVE

The 2009 context narrative may include an examination of documents warehoused. The narrative shall discuss Asarco's importance and the importance of the smelter on a local and regional scale. In addition, oral histories of smelter workers archived at the Montana Historical Society shall be reviewed to provide additional personal context to the corporate narrative.

3.6 CULTURAL RESOURCES INFORMATION SYSTEM (CRIS) FORMS

CRIS forms provide input for the State Historic Preservation Office Geographic Information System that enables researchers to quickly determine if any significant cultural resources are recorded within a specific project area. CRIS forms shall be completed for every significant structure. A legends map shall be prepared to correlate the information on the CRIS forms and the photographic record to assist future researchers to correlate the data.

3.7 ARCHIVAL QUALITY 5 BY 7 INCH PRINTS AND PHOTOGRAPH LOG OF EACH STRUCTURE

Photos shall be 5 by 7 inch acid free black-and-white prints presented in acid free photo pages in three ring binders. Each photo shall be identified using the National Register photo coding system. One Smithsonian number has been established for the entire facility. Electronic copies of all photographs will also be archived. All documentation shall be noted on each photo as required.

3.8 DELIVERABLES

The list of deliverables to be submitted for work performed in 2009 includes:

1. Plan Map of the Facility,
2. Photorecordation and Photo Log,
3. Drawings and Plans with index of drawings,
4. Cultural Resources Information System (CRIS) Forms with legends correlation map,

5. Videographic tape and DVDs,

6. Context Narrative, and

7. Final Report.

These deliverables will be submitted to SHPO for final approval. EPA will issue Asarco an approval letter releasing these buildings and structures for demolition.

4.0 PRE-CLEANING

The contractor shall be responsible for identifying and conducting pre-cleaning activities on all building and structures identified in the Work Plan, with the exception of the high grade building, truck scale, pump house, direct smelt building, coverall buildings, adobe shed, and concentrate storage and handling building. Pre-cleaning of these structures will not be necessary since they will continue to be utilized following Work Plan implementation. The contractor shall utilize the controls and guidance set forth in the contractor's HSP and HMAP. The pre-cleaning procedures that the contractor shall employ must address, at a minimum, management of ACM, used oils and liquids, universal wastes (UW), non-PCB and PCB light ballasts, and refrigerants from those structures and buildings identified in the Work Plan. FAA regulated lights located on the three stacks are considered a UW and will need to be removed prior to demolition. The pre-cleaning and off-site management of oils and other liquids from buildings and structures is necessary since the CAMU Phase 2 Cell cannot accept free liquids. Oils, universal wastes, and PCB articles removed from all buildings and structures identified in this Work Plan may be stored in the shop storage building. Asarco will be responsible for inspection and proper management of these materials placed inside the shop storage building. ACM shall be transported to the CAMU Phase 2 Cell. The pre-cleaning activities may commence prior to conducting the historic survey and recordation phase of the Work Plan.

5.0 CLEANING

The contractor is responsible for conducting all facets of the cleaning process. In most cases, the building and structures identified in the Work Plan have been utilized to store process material. The intent of the cleaning task prescribed in the Work Plan is twofold. First, the cleaning of building and structures that will not be demolished shall eliminate the presence of process material. The removal of hazardous waste from these building and structures will be deemed complete when no process materials are visible, as determined by MDEQ representatives. Second, the cleaning of buildings and structures scheduled for demolition shall reduce the potential for fugitive emissions during demolition activities. The contractor shall implement all necessary precautions, which shall be addressed in the contractor's HSP and DCP when working with and handling process material. The buildings and structures identified for cleaning are delineated on Sheet 4 and Sheet 5 in Appendix B. The cleaning activities may commence prior to conducting the historic survey and recordation phase of the Work Plan providing that these activities do not compromise the building or structure integrity.

5.1 CLEANING OF BUILDINGS AND STRUCTURES NOT SCHEDULED FOR DEMOLITION

The cleaning of buildings and structures not scheduled for demolition are shown on Sheet 4 in Appendix B. The cleaning of buildings and structures that will not be demolished shall consist of:

- Prepare identified work areas,
- Conduct initial, dry removal of bulk solids,
- Remove bulk materials,
- Conduct vacuum cleaning,
- Place vacuum solids in sealed containers,
- Haul all containers to CAMU Phase 2 Cell,
- Wash down identified work area,

- Manage wash down water within identified work area, and
- Haul dried solids to CAMU Phase 2 Cell.

Work area preparation will consist of delineating a work area that can be both easily contained and is considered a cohesive area unit. Once the work area has been defined, the contractor shall begin the removal of initial, bulk solids. The goal of this task will be to remove the gross, dry accumulation of process material at all areas within the identified structure or building. In certain structures and buildings, the contractor should anticipate using chipping, grinding, and jack hammering equipment to remove hardened, adhered, or fused materials. The bulk material collected using these techniques shall be placed into haul trucks, weighed, sampled, and transported to the CAMU Phase 2 Cell. An industrial vacuum system equipped with HEPA filtration shall augment the dry removal of process material. Material collected using the vacuuming procedures and removed baghouse bags shall be loaded via airtight chute into appropriate containers (i.e., double 6-mil mega bags, etc.), weighed, and hauled to the CAMU Phase 2 Cell. The contractor will be responsible for coordination of these activates with the Asarco engineering consultant.

The buildings and structures not scheduled for demolition shall require supplemental cleaning using low-volume, high-pressure washers. Upon completion of the gross process material removal and vacuuming of floors, walls, ceilings, and tank interiors, the contractor shall pressure wash all interior surfaces using low-volume, high-pressure washers. The contractor shall be responsible for removing all process material and cleaning these structures to the satisfaction of Asarco and MDEQ to ensure that no process material is visible. The contractor shall control the use and contain the presence of wash down water to the building, structure, or tank interior. The contractor shall augment the evaporation or absorption of wash down water and enhance the separation of solids to minimize their impact to Asarco's WTF. Any tank cleaning water or excess water not evaporated or absorbed shall be collected by the contractor and routed to Asarco's WTF. The specific cleaning procedures for building, structures, and tanks that are not scheduled for demolition is discussed below.

5.1.1 Hydrogen Peroxide Tanks

Two aluminum tanks, each having the capacity of 13,000 gallons, were used to store 50 percent hydrogen peroxide. The last of the hydrogen peroxide was drained from these tanks in July 2007. Bulk solids removal within these storage tanks will not be necessary. The contractor shall wash the interior of these tanks using a low-volume, high-pressure washer.

5.1.2 High-Grade Building

The high-grade building stored and processed high-grade material (containing appreciable amounts of precious metals) within a secured and gated facility. The high-grade material generally arrived in sealed containers or drums. The contractor shall anticipate minimal bulk solids removal from this building. The contractor shall vacuum clean the interior and surrounding area of the high-grade building to remove all visible process material. Once all bulk solids are removed and the entire interior of the building is vacuum cleaned, the contractor shall wash the interior (ceiling, walls, floor) of the building using a low-volume, high-pressure washer.

5.1.3 Truck Scale

The truck scale continues to be used to weigh incoming material that enters the facility and outgoing material that leaves the facility. The contractor shall anticipate nominal bulk solids removal from under the scale. The contractor shall vacuum clean the areas under and surrounding the truck scale to remove all visible process material. Once all bulk solids are removed and the entire area is vacuum cleaned, the contractor shall wash the surrounding area using a low-volume, high-pressure washer. To maximize cleaning efforts, the contractor shall schedule the cleaning of the truck scale near the end of the Work Plan activities.

5.1.4 Locomotive Crane Shed

The locomotive crane shed garaged the diesel electric crane and was used sparingly to store containerized process material. Bulk process material was not stored within the crane shed. Lime rock was placed around the exterior of this building to act as a run-on diversion berm. This building may have a partial dirt floor. The contractor shall remove all lime rock around

the exterior of the building. The contractor shall remove the lime rock fill from the maintenance pits. The contractor shall remove all debris inside and surrounding the building and vacuum clean the interior of the building's floor, walls, and ceiling to remove all visible material. Once all bulk solids are removed and the entire area is vacuum cleaned, the contractor shall wash the building interior using a low-volume, high-pressure washer. The RPE liner material located inside the building shall be sized to be no greater than 6ft by 6ft sheets before being placed in the CAMU Phase 2 Cell. The contractor will place sized RPE material in the CAMU Phase 2 Cell at the direction of Asarco's engineering consultant.

5.1.5 Cement and Dust Silos and Coke Hopper

The two enclosed silos were used to store cement and baghouse dust prior to these materials being placed into mixing agglomerators and the coke hopper was used to feed the previously demolished coke transfer belt. The silos and coke hopper have been previously cleaned so the contractor shall anticipate minimal bulk solids removal from these structures and the surrounding area. Small bin ventilation baghouses are located on the top of each silo. The contractor shall remove all bags from the baghouses and vacuum clean the baghouse interiors. The contractor shall wash the interior of the baghouses, silos, and coke hopper using a low-volume, high-pressure washer.

5.1.6 Soda Ash and Lime Silo

The enclosed silos stored soda ash and lime, which were once used as reagents in the Asarco's WTF. A small bin ventilation baghouses are located on the top of the silos. The contractor shall remove all bags from the baghouse and vacuum clean the baghouse and silo interior as well as the surrounding area. The contractor shall wash the interior of the baghouses and silos using a low-volume, high-pressure washer.

5.1.7 Pump House

The pump house contains pumps that previously provided water for 1) fire protection and process usage at the facility and 2) the closed circuit blast furnace cooling system. The building also contains an electrical storage room and an empty diesel tank. The contractor

will remove all debris in and around the building, vacuum clean the interior of the building's floor, walls, and ceiling, and clean the diesel tank. The contractor shall wash the interior of the pump house using a low-volume, high-pressure washer. The contractor shall be careful not to damage the water transfer line entering and exiting the building.

5.1.8 Storm Water Sump

The active sump collects storm water and routes it through an underground line to Thornock tank. The contractor will remove the lid on the sump and vacuum clean the interior of the sump to remove all sludge and clean the area surrounding the sump. The contractor will replace the lid on the sump, as it is still in use. The contractor shall be careful not to damage the water transfer line entering and exiting the sump.

5.1.9 Direct Smelt Building

The Direct Smelt Building (DSB) stored material that was designated for processing within the now demolished blast furnace. Recently, the DSB accumulated ACM prior to placement in the CAMU Phase 2 Cell. The contractor shall anticipate significant bulk solids and adhered material removal from this building, particularly behind the bins walls and along support beams. The contractor shall remove bulk solids and vacuum clean the interior and surrounding exterior of the DSB. This task shall include vacuuming process material from the interior of bins, from behind bin walls, and from the area surrounding the building. Once all bulk solids are removed and the entire interior of the building has been vacuum cleaned, the contractor shall wash the interior's ceiling, walls, beams, and floor using a low-volume, high-pressure washer.

5.1.10 Coverall Buildings

The two Coverall buildings were used to store process material prior to the material being directed to the smelting operation. Recently, the Coverall buildings accumulated hazardous wastes prior to the waste being placed in the CAMU Phase 2 Cell. In 2007, the interior floors of the buildings were washed down. The contractor shall dismantle the cement barriers (lego blocks) walls that line the inside of the coverall buildings. The individual lego

blocks shall be cleaned using a low-volume, high-pressure washer. The cleaned cement barriers may be stored on the concrete pad west of the coverall buildings. Sheet 4 in Appendix B identifies the outside location where clean cement barriers may be placed. Upon removal and cleaning of all cement barriers from these buildings, the contractor shall vacuum process material from the interior and from the area surrounding the building. The contractor shall wash the building interior floors, walls, ceiling, and support structures using a low-volume, high-pressure washer.

5.1.11 Adobe Shed

The adobe shed was used to manufacture and store adobe block for use at the blast furnace area. The contractor shall anticipate minimal bulk solids removal from this building. The contractor shall remove bulk solids and vacuum clean the interior and area surrounding the adobe shed. Once all bulk solids are removed and the entire interior of the building is vacuum cleaned, the contractor shall wash the interior (ceiling, walls, floor) of the building using a low-volume, high-pressure washer.

5.1.12 Utility Support Towers

Two metal support towers are located in close proximity to Asarco's WTF. The towers support active electrical conduits and water carrying pipes. The contractor shall anticipate minimal bulk solids removal from the towers and the surrounding area. Lift trucks or man hoists will be necessary to access the upper portions of the support towers. Some process material has adhered to the tower metal supports, which may require jack hammering or other physical removal methods. Once all bulk solids are removed and the two towers and surrounding areas have been vacuum cleaned, the contractor shall wash the towers using a low-volume, high-pressure washer.

5.1.13 Concentrate Storage and Handling Building (CSHB)

The concentrate storage and handling building (CSHB) was placed into operations in 1990 to house the majority of concentrate unloading and handling operations. Concrete bins stored materials such as concentrates, by-products, coke breeze, limerock, and silica. A bridge

crane accessed material from railcars and from within the bins for placement into material feeders. Feed hoppers proportioned the material onto conveyor belts for delivery to the now demolished sinter plant. The contractor shall anticipate significant bulk solids removal from this building, particularly behind the bins walls, inside the feed hoppers, within the feed area, and along support beams. Some process material may have adhered to the building or bin surfaces, which may require jack hammering or other physical removal methods. The contractor shall expect to use large mechanical equipment and considerable human resources to remove the bulk solids. The contractor shall also remove all visible process materials surrounding the building.

The contractor shall vacuum clean the interior and surrounding areas of the CSHB. This task involves removing all process material from but not limited to the interior of bins, behind bin walls, hoppers, feeders, cranes, railways, and belt lines. The large bins in the Concentrate Storage and Handling Building may be difficult to access. The contractor may consult with Asarco personnel to determine alternative access to bin interiors (i.e., creating access ports in bin walls). Once all bulk solids are removed and the entire interior of the building has been vacuum cleaned, the contractor shall wash the interior of the building using a low-volume, high-pressure washer.

5.2 CLEANING OF BUILDINGS AND STRUCTURES PRIOR TO DEMOLITION

The cleaning of buildings and structures prior to demolition are shown on Sheet 5 in Appendix B. The cleaning of building and structures that will be demolished shall consist of:

- Prepare identified work areas,
- Conduct initial, dry removal of bulk solids,
- Place removed bulk solids in sealed containers, and
- Haul sealed containers to CAMU Phase 2 Cell.

When compared to the cleaning of buildings and structures that are not scheduled for demolition, those buildings and structures that are scheduled for demolition will require less

precise cleaning. The reduced level of cleaning reflects the fact that the building and structures will be demolished and will no longer exist. As before, work area preparation will consist of delineating a work area that can be both easily contained and is considered a cohesive area unit. Once the work area has been defined, the contractor shall begin the removal of bulk solids. The goal of this task will be to remove the gross, dry accumulation of contamination (baghouse bags, process material, etc.) at all accessible areas. Personnel utilizing hand tools shall perform these tasks. A trailer mounted industrial vacuum system equipped with HEPA filtration shall augment the dry removal of process material. Material collected using these procedures shall be loaded via airtight chute into appropriate containers (i.e., double 6-mil mega bags, etc.), weighed, and hauled to the CAMU Phase 2 Cell. The removal of the baghouse bags and dry accumulation of process material will ensure more effective dust control during demolition. The specific cleaning procedures for building, structures, and tanks that are scheduled for demolition is discussed below.

5.2.1 Sample Mill and Dust Loadout Baghouses

The sample mill building served to prepare and split incoming ore concentrates, interplant by-products, crude ores, and high-grade ores prior to chemical analysis and moisture content determination. The individual sample mill process equipment included scales, bucking tables, rod mills, and drying ovens. The bucking rooms were ventilated by the sample mill baghouse. The dust loadout facility was used sparingly to ventilate blast furnace baghouse dust transfer. The contractor shall remove all the bags from the sample mill and dust loadout baghouses and vacuum clean the baghouse interiors prior to demolition.

5.2.2 Crushing Mill Baghouses

The crushing mill was used for size reduction and sampling of crude ores and plant by-products. The individual crushing mill process equipment includes a track hopper, conveyor belts, crushers, feeders, screens, and samplers. The crushing mill utilized three baghouses (two of which are also known as the No. 7 and No.8 sinter plant baghouses) to provide source ventilation. The contractor shall remove all the bags from the baghouses and vacuum clean the baghouse interiors prior to demolition.

5.2.3 Sinter Stockpile Building Baghouse

The sinter stockpile building temporarily stored sinter prior to it being processing in the now demolished blast furnace. The sinter stockpile baghouse is located on top of the sinter stockpile building. The contractor will remove all the bags from the baghouse and vacuum clean the baghouse interior prior to demolition.

5.2.4 Concentrate Storage and Handling Building (CSHB) Baghouses, Ventilation Ductwork, and Stack Base

Two large baghouses provided ventilation to the CSHB. A smaller baghouse provided ventilation to the CSHB feeder area. The sinter plant weak gas handling baghouse and new crushing mill baghouse are attached to the east side of the CSHB. The contractor shall remove all the bags from the baghouses and vacuum clean the baghouse interiors, all associated ventilation piping, and the associated stack base prior to demolition. In addition, the contractor shall relocate and resupport overhead power lines and an above ground gas line attached to these structures prior to cleaning. Relocation of the power lines will require a variance from the FAA, which the contractor will be responsible for obtaining, as this line supplies power to the Blast Furnace Stack beacon lights.

5.2.5 Hopto Pad, Storage Bins, and Conveyor Gallery

The hopto pad, storage bins, and conveyor unloaded and transferred certain ores and by-products. The ores and by-products were unloaded by a large back-hoe (hopto), placed into a storage bins or receiving hopper, and transferred via a conveyor belt system to the former ore receiving and proportioning building, now known as the direct smelt building. The contractor shall remove any large debris and vacuum clean the hopto pad, storage bins, conveyor gallery, and associated tunnel prior to demolition.

5.2.6 Acid Dust Facility

The facility stored acid dust within an enclosed silo. The acid dust was agglomerated prior to being conveyed to the CSHB. A small bin ventilation baghouse is located on the top of the silo. The contractor will remove all the bags from the baghouse and vacuum clean the

baghouse interior. The contractor will vacuum clean the interior of the silo and acid dust building prior to demolition. In addition, the contractor shall relocate and resupport overhead power lines attached to the structure prior to cleaning. Relocation of the power lines will require a variance from the FAA, which the contractor will be responsible for obtaining, as this line supplies power to the Blast Furnace Stack beacon lights.

5.2.7 Groundwater Sump

The sump previously collected groundwater in the vicinity of the direct smelt building. Groundwater was pumped from the sump to the internal water handling system to prevent flooding of nearby buildings. After re-construction of the direct smelt building, the necessity of the sump was eliminated. The sump has not been used in the last 10 to 15 years. The contractor shall vacuum clean the base of the four-foot diameter, 14 ½-foot deep groundwater sump that exists near the highline railroad prior to abandonment.

6.0 DEMOLITION

The demolition activities set forth in this Work Plan require extensive experience to coordinate services and minimize migration of dust and material. The demolition of a structures and buildings shall be achieved in a variety of manners depending on the type of structure, reasons for demolition, the proximity to the surrounding structures, safety, and the requirements for salvage. The contractor shall use a sequence of demolition approach for the major building structure and shall compile information from the onsite as-built drawings, and onsite inspections of the buildings to allow our operations and staff to formulate a sequence of demolition of each building to ensure safe working conditions.

As with every demolition project, the principle considerations are stability of the building structure and the safety of the working personnel and related areas within the collapse envelope of the structures. The following section outlines contractor demolition procedures. A 2009 Demolition Plan Map, Sheet 6 in Appendix B, shows the demolition locations discussed in this section. The demolition activities may only commence after the historic survey and recordation phase of the Work Plan has been completed and notice to proceed has been issued by MDEQ and EPA.

6.1 ISOLATION ACTIVITIES BEFORE DEMOLITION OF STRUCTURES

Before and/or concurrent with the cleaning of process material, the contractor shall conduct isolation activities to create a physical separation of the Work Plan areas from the surrounding structures to include but not limited to piping, conduits, and buildings that are to remain in place. This process shall be conducted using a variety of methods that employ both excavators equipped with shear attachments and laborers with hand tools and cutting equipment. Prior to initiation of the isolation work, the contractor shall perform an investigative site walk with Asarco personnel to re-mark and re-designate the lines of separation between the demolition areas and surrounding areas to remain.

Upon completion of the isolation task, a physical separation shall exist that will ensure areas to remain are protected in place and that the demolition activities can progress unimpeded. The contractor shall inspect the operations to ensure that exclusion zones are established and that safe working conditions exist at all times. The contractor shall conduct regular daily safety meetings to discuss methods, exclusion zones, and safety practices.

6.2 DEMOLITION OF BUILDINGS AND STRUCTURES

Four general areas have been identified for demolition under the Work Plan. The structures, soil berm, and railroad tracks scheduled for demolition and removal in the vicinity of the sample mill and crushing mill are shown on Sheet 7 in Appendix B. The structures scheduled for demolition in the hopto pad, storage bins, and conveyor gallery, and acid dust facility are shown on Sheet 7 in Appendix B. The structures scheduled for demolition in the vicinity of the sinter stockpile building, railroad highline, abandoned and new breaking floor buildings, groundwater sump, sinter plant stack, acid plant stack, and blast furnace stack are shown on Sheet 8 in Appendix B. The structures scheduled for demolition associated with the CSHS ventilation system and stack are shown on Sheet 9 in Appendix B. All demolition material and excavated soil shall be hauled to the CAMU Phase 2 Cell. Recyclable material shall be managed in accordance with the procedures set forth in Section 2.3, Recyclable Material Plan. The two stockpiles of used railroad ties that are stored near the facility main entry gate and on the northwest section of the slag pile shall be placed in the CAMU Phase 2 Cell.

6.2.1 Sample Mill

Once the pre-cleaning, cleaning of the sample mill baghouse, and the historic survey and recordation of the sample mill are complete, demolition can commence. The contractor will remove the entire sample mill structure to grade level. The railroad rails and ties south and north of the sample mill shall be removed. A soil berm, shown on Sheet 7 in Appendix B, shall be removed to allow for proper drainage of the interim liner once installed within the demolition area. In addition, two columns that once supported previously removed ventilation piping and several poles shall be demolished.

6.2.2 Crushing Mill

Once the pre-cleaning, cleaning of the crushing mill baghouses, and the historic survey and recordation of the crushing mill are complete, demolition can commence. The contractor will remove the entire crushing mill structure to grade level. The contractor shall remove all underground conveyors in the vicinity of the crushing mill hopper. A soil berm and section of railroad track, shown on Sheet 7 in Appendix B, shall be removed to allow for proper drainage of the interim liner once installed within the demolition area.

6.2.3 Hopto Pad, Storage Bins, and Conveyor Gallery

Once the pre-cleaning, cleaning of the hopto pad, storage bins, and conveyor gallery area, and the historic survey and recordation of this area are complete, demolition can commence. Demolition shall include removing all concrete walls to grade level, cutting all protruding rebar to grade, and knocking in the tunnel roof, shown on Sheet 7 in Appendix B, to allow for easy backfill operations.

6.2.4 Acid Dust Facility

Once the pre-cleaning, cleaning of the acid dust facility, baghouse, and silo, and the historic survey and recordation task for the acid dust facility are complete, demolition can commence. The contractor shall remove the entire acid dust facility structure, as shown in Sheet 7 in Appendix B, to grade level. The acid dust facility shall be removed without compromising the integrity of the CSHB. The contractor shall patch any openings in the CSHB created from removal of this structure to the satisfaction of Asarco. This will involve the contractor submitting in writing a plan for patching the building, which is acceptable to Asarco.

6.2.5 Sinter Stockpile Building

Once the pre-cleaning, cleaning of the sinter stockpile building baghouse, and the historic survey and recordation of the sinter stockpile building are complete, demolition can commence. The contractor shall remove the entire sinter stockpile building structure, as shown on Sheet 8 in Appendix B, to grade level.

6.2.6 Highline Railroad

Once the pre-cleaning and the historic survey and recordation of the highline railroad are complete, demolition can commence. The contractor shall remove the entire highline railroad and associated structures, as shown on Sheet 8 in Appendix B, to grade level. The large cement bins associated with the highline railroad and highline sump shall be removed to grade level. Some structures associated with the highline railroad are attached to the Direct Smelt Building. These structures shall be removed without compromising the integrity of the Direct Smelt Building. The contractor shall patch any openings in the Direct Smelt Building created from removal of these structures to the satisfaction of Asarco. This will involve the contractor submitting in writing a plan for patching the building, which is acceptable to Asarco. The contractor shall be careful not to damage the water transfer line located close to this structure.

6.2.7 Abandoned and New Breaking Floor Buildings

Once the pre-cleaning and the historic survey and recordation of the abandoned and new breaking floor buildings are complete, demolition can commence. The contractor shall remove the entire abandoned and new breaking floor buildings, as shown on Sheet 8 in Appendix B, to grade level. Some structures associated with the Abandoned breaking floor building are attached to the Direct Smelt Building. These structures shall be removed without compromising the integrity of the Direct Smelt Building. The contractor shall patch any openings in the Direct Smelt Building created from removal of these structures to the satisfaction of Asarco. This will involve the contractor submitting in writing a plan for patching the building, which is acceptable to Asarco. The contractor shall be careful not to damage the water transfer line located close to this structure.

6.2.8 Groundwater Sump

Once the pre-cleaning, cleaning, and the historic survey and recordation of the groundwater sump are complete, demolition can commence. The contractor shall abandon the above ground section of the four-foot diameter, 14 ½ foot deep sump, as shown on Sheet 8 in

Appendix B, that exists near the highline railroad. The contractor shall grade and back fill the sump with flowable fill according to specifications set forth in Section 12.0.

6.2.9 CSHB Ventilation System and Stack

Once the pre-cleaning, cleaning of the ventilation system and stack base, and the historic survey and recordation task for the CSHB ventilation system and stack are complete, demolition can commence. The contractor shall remove the entire CSHB ventilation system and stack, as shown in Sheet 9 in Appendix B, to grade level. No special procedures are expected for demolition of the CSHB stack. The CSHB ventilation system and stack shall be removed without compromising the integrity of the CSHB. The contractor shall patch any openings in the CSHB created from removal of these structure to the satisfaction of Asarco. This will involve the contractor submitting in writing a plan for patching the building, which is acceptable to Asarco. All concrete footings and slabs in this area shall be left in place and any protruding steel shall be cut to grade. Any structure, building, monitoring well, lining system, roadway, competent concrete, or similar feature impacted by the demolition of the ventilation system will be repaired or replaced by the contractor. In addition, the contractor will be responsible for the integrity of the existing interim temporary cover system.

6.2.10 Acid Plant Stack, Blast Furnace Stack, and Sinter Plant Stack

In accordance with the AOC, the interior cleaning of these three stacks took place during the third quarter 2007. No additional cleaning is required prior to the demolition of these stacks. The contractor shall demolish the three stacks in accordance with the SDP. The contractor will be responsible for protecting surrounding structures, including windows, doors, and equipment. Any structure, building, monitoring well, lining system, roadway, competent concrete, or similar feature impacted by the demolition of the stacks will be repaired or replaced by the contractor. In addition, the contractor will be responsible for the integrity of the existing interim temporary cover system. The contractor shall remove the entire above grade section of the three stacks, as shown on Sheet 8 in Appendix B.

6.2.11 Miscellaneous Railroad Ties

Previous used, miscellaneous railroad ties are located at two sites, as shown on Sheet 2 in Appendix B. The railroad ties located at these two sites locations shall be transported by the contractor to the CAMU Phase 2 Cell.

6.3 STOCKPILING AND MATERIAL SIZING

As demolition progresses, material may be stockpiled in designated material staging and processing areas located within the demolition area footprints, as shown on Sheet 6 in Appendix B. Both general demolition debris and recyclable material may be sized at these locations to meet the requirements for final disposition. Once demolition debris and salvage material has been segregated and sized, the contractor will load, direct the loads for weighing (to be performed by Asarco's engineering consultant), and transport to the CAMU Phase 2 Cell or a recycling location. The contractor must coordinate these activities with Asarco's engineering consultant. The contractor shall ensure that CAMU Phase 2 Cell bound material is sized to be less than 24 inches in one dimension. The contractor shall size the recyclable material to its requirements and stage these materials for eventual loading into railcars and/or trucks for transport to the recycling facility.

7.0 WASTE AND RECYCLABLE MATERIAL MANAGEMENT

The contractor shall utilize the components of this Work Plan section for coordination and off-site management of the waste streams and recyclable materials that are expected to be generated during the Work Plan. This Work Plan section has been developed to provide guidance, direction, and procedures for managing waste steams (both solid and liquid) and recyclable materials generated as a result of pre-cleaning, cleaning, and demolition activities.

7.1 MATERIAL SCENARIOS AND MANAGEMENT OPTIONS

During the Work Plan implementation, waste streams and recyclable material are expected to be generated. The potential categories and required management options are:

- Friable and non-friable ACM – CAMU Phase 2 Cell,
- Used oil and liquids – Off-site management,
- Universal waste (UW) – Off-site management,
- PCB light ballast – Off-site management,
- Refrigerant – Off-site management,
- Recyclable material - Off-site management,
- Cleaning and demolition material – CAMU Phase 2 Cell

Asarco does not anticipate encountering any non-CAMU eligible wastes other than those outlined above. Non-CAMU eligible waste will be managed in accordance with applicable rules and regulations. The contractor shall be responsible for the management of friable and non-friable ACM, refrigerant, recyclable material, and cleaning and demolition material. Asarco will manage the used oil and liquids, universal waste, and PCB light ballast that have been placed in the Shop storage building.

7.2 MANAGEMENT OF NON-CAMU MATERIAL STREAMS

The contractor shall containerize all non-CAMU Phase 2 Cell destine material that may encountered during the Work Plan implementation. Recyclable materials will be containerized to meet the specifications of the recycling facility. For all other non-CAMU

Phase 2 Cell destine materials, the contactor shall use containers made of or lined with components, which will not react with, and are otherwise compatible with, the material to be transferred or stored, so that the ability of the container to contain the waste is not impaired. If a container holding non-CAMU Phase 2 Cell material becomes compromised (e.g. severe rusting, apparent structural defects), or if it begins to leak, the contractor shall immediately transfer the material to a secure container. The contractor shall inspect containers and areas used to accumulate containerized materials at least weekly. Asarco will be responsible for inspecting containers placed into the shop storage building.

Incompatible wastes shall not be placed within the same container. The contractor shall handle and manage incompatible waste in such a manner that prevents violent reactions, generation of uncontrolled fumes, mists, gases and dusts, production of flammable fumes or gases and damage to the integrity of the material container.

Hazardous materials shall not be placed in an unwashed container that previously held an incompatible material. A container holding hazardous materials that is incompatible with any material transferred or stored nearby in other containers, piles, open tanks, or surface impoundments shall be separated from the other material.

The contractor shall store all hazardous material in containers suitable for transport in accordance with 49 CFR Parts 170 through 179 or the requirements of the transporter, whichever is more stringent. No material shall be transferred or stored in a manner, which may rupture the container or cause it to leak.

7.3 LABELING OF MATERIALS

The contractor shall apply proper marking and labeling on all containers when the material is first placed inside the container. Hazardous material that is stored in bulk shall be posted with a sign that bears an appropriate label as well as the information required for waste area signs, as applicable.

During pre-cleaning activities or as otherwise encountered, the contractor may encounter waste streams that are placed into unidentified containers or the exact contents are unknown. For those instances, the contractor will mark the container with a "Non-Classified Material: Laboratory Analysis in Progress" label. This label will identify the material as an uncharacterized material stream. The contractor shall indicate on the label where the containerized material originated and, if a reasonable amount of information is available, the suspected material contents. An accumulation date will be added to the label. The contractor shall immediately notify Asarco when unidentified materials are first encountered. The material determination and accumulation of materials shall be managed in accordance with applicable rules and regulations.

7.4 MANAGEMENT OF CAMU APPROVED MATERIAL

Demolition material will be loaded with track or rubber-tired loaders and transported via trucks to the CAMU Phase 2 Cell. Friable ACM shall be wrapped and contained, loaded, weighed, transported, and placed in the CAMU Phase 2 Cell in such a manner that the integrity of the wrapping is not breached. At no time will friable material be exposed to the environment. Non-friable ACM does not require special containerization prior to placement in the CAMU Phase 2 Cell. The contractor shall strictly enforce the dust control measures, as described in the DCP, to ensure control of materials placed in the CAMU Phase 2 Cell. The placement of waste into the CAMU Phase 2 Cell will be governed by the specifications set forth in the approved CAMU Design Analysis Report (including the May 22, 2008 addendum) as discussed in Section 8.0. A copy of the CAMU Design Analysis Report will be provided to the contractor.

7.5 MATERIAL MANAGEMENT QUALITY CONTROL

Material management quality control will be accomplished through the use of administrative, engineering, and physical controls that will include, but not be limited to the following:

- Routine inspections of material storage areas,
- Curtailing of work activities during high wind conditions (over 15 MPH average hourly rate),

- Curtailing of material handling and transport during rain events with sufficient volume to create run-off,
- Pre-identification and handling of material requiring special management, and
- Decontamination of equipment used to handle material.

7.5.1 Inspections

The contractor shall implement inspection procedures to assure control of material that have been placed into material storage areas. The contractor shall conduct, at least weekly, inspections of the areas designated for container storage or transfer. The contractor shall inspect the area for evidence of deterioration of containers and secondary containment. Additionally, inspection of container labeling and accumulation dates will be completed to ensure that all containers are properly and legibly labeled. Accumulation dates will be reviewed for compliance. The contractor shall inspect containers and storage areas to ensure that they are not, have not, and will not be susceptible to any weather event that could cause release of a hazardous material streams onto the site or into the storm water system.

7.5.2 Work Stoppage

The contractor shall halt work when weather conditions are such that the spread of contaminated dust and debris is likely. These conditions typically exist when there is excessive wind and/or rain. Therefore, if wind with a 15 MPH average hourly rate or more are present, the contractor shall halt the handling of waste. If a rain event begins, the contractor shall evaluate the site conditions. If the rain presents no run-off, work activities will proceed uninhibited. In the rain presents run-off conditions, the work activities shall cease until such time that a run-off potential is not present. The contractor will evaluate these conditions with Asarco's engineering consultant.

7.5.3 Special Material Handling and Segregation

The contractor will ensure that all material requiring special handling have been removed from the structures to be demolished. Special materials shall consist of ACM, UW, used oils, and liquid wastes, PCB ballasts, and refrigerant. UW, liquid wastes, PCB ballast, and refrigerant shall be removed from buildings and structures, handled, and stored as non-

CAMU Phase 2 Cell materials. ACM material that is scheduled for placement in the CAMU Phase 2 Cell will be segregated.

7.5.4 Decontamination of Equipment

The contractor shall provide for the decontamination of equipment used in the handling and/or transport of demolition debris prior to the equipment leaving the site, or moving from a demolition zone to an area considered clean. The contractor shall establish a decontamination pad, in an area agreed and approved by Asarco. The location of the decontamination pad may change depending upon demolition activities and the evolution of the project site. This decontamination pad shall be situated on a concrete slab suitable for placement of heavy equipment.

Decontamination will consist of one or a combination of the brushing, vacuuming, or washing methods. The goal of the decontamination is to remove metal bearing dust and debris from the areas of the equipment that came into contact with this material. Upon completion of the decontamination activity, any removed dust and debris will be hauled to the CAMU Phase 2 Cell.

Equipment that has been decontaminated will be inspected upon completion to ensure the adequacy of the process and to document the process to ensure quality control.

8.0 WASTE HAULING, PLACEMENT, AND CAMU PHASE 2 CELL OPERATION AND CLOSURE

8.1 OPENING CAMU PHASE 2 CELL FOR WASTE PLACEMENT

The contractor shall be responsible for opening the CAMU Phase 2 Cell prior to the placement of waste material generated under this Work Plan. The contractor shall ensure that all site storm water controls are in proper working order, make any necessary repairs, and follow all state and federal storm water regulations. The temporary reinforced polyethylene (RPE) liner, currently covering the waste shall be thoroughly perforated by the contractor so that it will not hold water, prior to waste placement. This shall be accomplished by cutting the RPE liner and underlying 10-ounce non-woven geotextile into pieces that are 36 square feet or smaller. In addition, the contractor will need to remove the RPE liner around the exterior of the CAMU Phase 2 Cell, including the liner buried in the anchor trenches, so that the liner does not extend past the boundary of the cell. The RPE liner and geotextile material located outside the CAMU Phase 2 Cell boundary shall be sized to less than 6-foot by 6-foot sheets before being placed in the CAMU Phase 2 Cell. The contractor shall place these sheets in the CAMU Phase 2 Cell under the direction of Asarco's engineering consultant.

8.2 CAMU WATER MANAGEMENT

Any storm water contacting the waste material shall not be discharged, but shall be transferred to the Asarco WTF. The contractor shall be responsible for management of water reporting to the CAMU Phase 2 Cell leachate collection sump while the CAMU Phase 2 Cell is open. Asarco's engineering consultant will be responsible for management of water reporting to the CAMU Phase 2 Cell leak detection sump throughout Work Plan implementation. The contractor shall have readily available pumps capable of pumping 400 gallons per minute in the event of a significant rainfall event. The contractor will remove any water from the leachate collection system, collect the water in a tank, and deliver the water to the Asarco's WTF.

8.3 ON-SITE DEBRIS TRANSPORTATION

The contractor shall implement a proactive approach to ensure that the transportation of waste debris does not generate dust or spread waste debris outside the limits of the loading area and the final CAMU Phase 2 Cell placement area. For all management of demolition debris, the contractor shall utilize the Dust Management Plan. The implementation of the Dust Management Plan will minimize airborne dust during the loading operation and constitute the initial dust prevention step during transportation. The contractor shall use end dump trucks, side dump trucks, 10-wheel dump trucks, or similar containerized equipment to haul the material to the CAMU Phase 2 Cell. All trucks must be equipped with sealed tailgates that will be closed during times of hauling to ensure that debris is not released outside the limits of the loading and dumping area.

8.4 OFF-SITE PREPARATION AND TRANSPORT

The contractor shall ensure that the debris leaving the facility for eventual placement in the CAMU Phase 2 Cell, is weighed, sampled, and moistened and is responsible for coordinating with Asarco's engineering consultant. ACM shall be weighed but not sampled. The contractor shall direct all haul trucks to an on-site scale for weighing. Asarco's engineering consultant shall weigh and photograph all waste being transported to the CAMU Phase 2 Cell. Representative samples will be collected from the trucks payload at the interval specified in Section 9.0 of this Work Plan. The contractor shall erect and use a moistening station that consists of a scaffolding platform on which personnel will mist water on the loaded debris as a final step before exiting the site. The water spray will add a final moisture barrier and binder to the debris for the short distance haul to the CAMU Phase 2 Cell. All transport vehicles shall be limited to a maximum of 10 miles per hour during transport. Limiting speeds shall minimize dust from becoming airborne during transport and shall minimize kick-up from rolling tire action. In addition, the contractor shall place and maintain large gravel on a section of the haul route at the plant exit and CAMU exit, to remove loose dust and debris from haul truck tires. Once hauling of waste is complete, the contractor will place this gravel material in the CAMU Phase 2 Cell.

8.5 PLACEMENT OF WASTE

Once haul trucks arrive at the CAMU Phase 2 Cell, the material will be placed into the cell at a location specified by the contractor. ACM is the only material with a designated location within the CAMU Phase 2 Cell. Asarco's engineering consultant will direct the contractor to this location. A water truck shall be located in close proximity to the CAMU Phase 2 Cell to lightly mist debris and knock down any dust during the material dumping and spreading phase. The use of water will be kept to a minimum. Additional water will be applied to locations in the CAMU Phase 2 Cell to minimize the potential for fugitive dust emissions. Asarco reserves the right to stop placement of waste in the CAMU Phase 2 Cell if visible fugitive dust emissions are present. Materials will be placed and compacted in the cell to minimize voids, settlement, and damage to the liners. Demolition debris and waste soils will be placed and compacted in the cell in lifts not to exceed 2 feet thick across the bottom of the cell. All materials delivered to the cell for placement will require some segregation. This will allow consolidation of the materials during compaction and will result in a homogeneous mass with a minimal amount of voids. Specifically, bulk concrete and metal debris will be broken or otherwise reduced in size not to exceed a vertical dimension of 2 feet. There are no horizontal or width dimension restrictions other than the debris must fit in a haul truck to be transported to the CAMU Phase 2 cell. All material requiring size reduction will be resized at the structure demolition site using excavators with concrete breakers or shears before being transported to the CAMU Phase 2 Cell. Large organic material (e.g. timbers) and manufactured metal will be placed horizontally in the cell as flat as possible to minimize voids. The railroad ties placed in the CAMU Phase 2 Cell will not be piled in one location, but will be spread out evenly throughout the CAMU Phase 2 Cell footprint. Asarco's engineering consultant will inspect the open CAMU Phase 2 Cell at least twice daily to assess the potential for windblown dispersion of fugitive dust.

8.6 WASTES REQUIRING SPECIAL MANAGEMENT

Wastes requiring special management include ACM and heavy metal dust from cleaning activities. The procedures for containerizing these wastes shall be conducted in the demolition areas prior to the materials being loaded on haul trucks. ACM and heavy metal

dust will be handled according to the procedures outlined in Section 2.0 of this Work Plan and in the contractor's HMAP. All friable ACM shall be wrapped, contained, loaded, transported, and placed in the southwest corner of the CAMU Phase 2 Cell in such a manner that the integrity of the wrapping is not breached. Once the ACM has been placed in the cell, its location will be surveyed by Asarco's engineering consultant. The ACM shall be covered daily with soil to maintain the integrity of the wrapping. The location of the ACM shall be shown on the as-built drawings of the CAMU Phase 2 Cell. At no time will friable ACM be exposed to the environment. Non-friable ACM will be loaded and transported as described above for demolition debris. All ACM (both friable and non-friable) will be completely covered at the end of each work-day

8.7 WORK STOPPAGE

Work shall halt when weather conditions are such that the spread of contaminated dust and debris is likely. These conditions typically exist when there is excessive wind and/or rain. Therefore, if wind with sustained readings of 15 MPH (average hourly rate) or more occur, the handling and hauling of waste both on-site and off-site will halt. The sustained wind speeds will be monitored by Asarco's engineering consultant through the use of a calibrated on-site anemometer and through data provided by the National Oceanic and Atmospheric Administration (NOAA) at www.noaa.gov for wind speeds at the Helena Airport. Furthermore, if a rain event begins, site conditions will be re-evaluated. If a rain event begins, the contractor shall evaluate the site conditions. If the rain presents no run-off, work activities will proceed uninhibited. In the rain presents run-off conditions, the work activities shall cease until such time that a run-off potential is not present. The contractor will evaluate these conditions with Asarco's engineering consultant. In the event that transport is halted, no additional trucks will be loaded and trucks containing wastes will be covered until conditions improve.

8.8 DECONTAMINATION AND INSPECTION OF EQUIPMENT

The equipment used in the handling and/or transport of demolition debris will be decontaminated prior to the equipment leaving the site, or moving from a demolition zone to

an area considered clean. Decontamination pads, a concrete slab suitable for placement of heavy equipment, will be established, in areas agreed upon with and approved by Asarco. The location of the decontamination pads may change as demolition activities progress. However, all equipment will be decontaminated within close proximity to exits from the Asarco facility. The equipment that has been decontaminated will be inspected upon completion to ensure the adequacy of the process and to document the process to ensure quality control prior to the transport vehicle leaving the site.

Decontamination will consist of one or a combination of brushing, vacuuming, or washing methods. The goal of the decontamination is to remove heavy metal laden bearing dust and debris from the areas of the equipment that contacts the waste. Upon completion of the decontamination activities, any removed dust and debris residue will be hauled to the CAMU Phase 2 Cell.

Haul trucks leaving the CAMU Phase 2 Cell will be traveling on paved haul roads and will not be decontaminated until enter the Asarco smelter facility, where they will be decontaminated on one of the decontamination pads. Any large debris will be dislodged from haul trucks as they leave the CAMU Phase 2 Cell. The section of haul road between the CAMU Phase 2 Cell and the Asarco facility will be monitored and swept on a regular basis. Asarco's engineering consultant shall inspect the haul road twice daily.

Transport vehicles will be inspected periodically to ensure that truck beds and gates are properly sealed and that debris is not building up. Full decontamination of vehicles that are leaving the Asarco facility should occur periodically.

The equipment used in the CAMU Phase 2 Cell for spreading and compacting waste will be decontaminated at the Asarco facility. This equipment will be placed on trailers and driven via the haul road back to the Asarco facility for decontamination in a designated area.

8.8.1 Work and Road Surface Cleaning

The contractor shall implement the road surface cleaning procedures set forth in the Dust Control Plan.

8.9 SPILL MITIGATION

Spills of soils or debris being transported to the CAMU Phase 2 Cell shall be prevented by constant maintenance of trucks to make sure they are properly sealed and in good working order. In addition, traffic control and slow truck speeds will minimize the occurrence of accidents. If waste is spilled in route to the CAMU Phase 2 Cell, the hauling of waste will halt and the spilled waste will be cleaned using clean decontaminated equipment. If the spill occurs on the haul road, the road will be swept clean.

The twice-daily inspections, Section 8.10, of the area surrounding the CAMU Phase 2 Cell shall include observations for visible fugitive emissions. If a release from the area is observed during an inspection, the waste will be removed and cleaned using clean decontaminated equipment and placed in the CAMU Phase 2 Cell.

8.10 SITE INSPECTIONS – OPERATION

Asarco's engineering consultant will perform inspections of areas surrounding the CAMU Phase 2 Cell and the haul road between the CAMU and ASARCO smelter facility twice daily when the CAMU cell is in operation. Daily inspections of the road used for hauling waste will occur when the haul road is in use. While the CAMU cell is in operation it will be inspected once per week by Asarco's engineering consultant. Quarterly monitoring of groundwater quality and semi-annual site inspections will ensure that public health and safety are maintained at the site. Monitoring and inspection protocol shall be conducted in accordance with 40 CFR 264.303.

8.10.1 Daily Inspections

While the landfill is in operation, inspection of the grounds surrounding the CAMU shall be inspected twice daily. These inspections shall include an assessment of the potential for

windblown dispersion of fugitive dust from the CAMU and a visual inspection of the grounds surrounding the CAMU for any visible releases of fugitive dust from the CAMU cell. The haul route used by trucks leaving the CAMU and returning to the ASARCO smelter facility shall also be inspected twice daily to ensure that it remains clean and free of dust and debris. The remainder of the haul road shall be inspected once per day to ensure that it is free of dust and debris. Daily inspections shall be documented and recorded on the Daily Inspection Form included in the CAMU Design Analysis Report and any problems found will be reported to the project manager and addressed immediately.

8.10.2 Weekly Inspections

While the landfill is in operation, it shall be inspected weekly and after significant storms to detect evidence of any deterioration, malfunctions, or improper operation of run-on and runoff control systems, and the proper performance or presence of liquids in the leachate collection and leak detection system. Inspection of the perimeter fence, gates, condition of haul roads, condition of storm water pond, presence of precipitation run-off or ponded liquids, condition of decontamination pads, and the condition of haul trucks will be included in weekly inspections and any maintenance needed will be recorded on the Weekly Inspection Form included in the CAMU Design Analysis Report and addressed appropriately.

8.11 CLOSING THE CAMU PHASE 2 CELL

Upon completion of placement of demolition debris and waste soils in the CAMU Phase 2 Cell, the final CAMU cap shall be constructed. This component of the CAMU Phase 2 Cell cap closes the CAMU Phase 2 Cell and prevents infiltration of precipitation. The final cover consists of a 40-mil double-sided textured HDPE FML, underlain by a geosynthetic clay liner, as specified in the CAMU Design Analysis Report, approved by the EPA. The contractor shall grade all waste placed in the CAMU Phase 2 Cell according to the specifications in the CAMU Design Analysis Report to allow for proper drainage off the final cover. In addition, the contractor shall ensure that no rebar, sharp metal, or sharp concrete edges protrude from waste. The final cover shall be installed according to the design drawings and specifications presented in the approved CAMU Design Analysis

Report and summarized in the following sections. The design drawings and specifications contained in the CAMU Design Analysis Report are also included in Appendix C of this Work Plan.

8.11.1 Cap Composite Liner

This component of the CAMU Phase 2 Cell cap closes the CAMU Phase 2 Cell and prevents infiltration of precipitation. It consists of a 40-mil double-sided textured HDPE FML, underlain by a geosynthetic clay liner (GCL). The geosynthetic clay liner will be needle punch reinforced GCL comprised of a uniform layer of granular sodium bentonite encapsulated between a scrim reinforced non-woven and a virgin staple fiber non-woven geotextile. The needle-punched fibers shall be thermally fused to the scrim reinforced non-woven geotextile to enhance the reinforcing bond. All seams must be overlapped a minimum of 12 inches and sealed with powdered bentonite sealing compound. Seams must be oriented parallel to the line of maximum slope. No horizontal seams should be allowed on the slopes.

An HDPE geomembrane was chosen for this FML to ensure that the permeability of the cap liner is no less than the cell liner system, as required by 40 CFR 264 subpart N. In addition to acting as a component of the composite liner, the GCL covering the waste material provides a smooth surface for installation of the cap FML and provides an additional factor of safety in preventing percolation through the cap.

8.11.2 Gas Collection System

This system is designed to collect and remove gas generated from the waste and consists of a series of 4-inch perforated corrugated HDPE pipes embedded in a 1-foot thick layer of ¼ - inch to ½-inch gravel. The piping directs the gas to one of five vent pipe risers located in the center and at each corner of the top of the cell. The vent pipe risers consist of 4-inch smooth HDPE pipe, which extend approximately 12 inches above the top of the cap. The risers will be shaped like a “candy cane” and will have screens over the open end of the pipe to prevent precipitation or objects from entering the pipe. Concrete collars will be place around the vent pipes for additional support.

8.11.3 Surface Water Collection and Removal (SWCR) System

This system allows surface precipitation to drain away from the surface of the Cap Composite Liner, and consists of a 1-foot thick layer of drain gravel on a 3 percent slope. This layer drains to a corrugated drain pipe embedded in a gravel-filled trench at the toe of the CAMU Phase 2 Cell cap slope. The drain pipe outlets to a shallow infiltration and evaporation pond adjacent to the CAMU Phase 2 Cell which prevents run-off from mixing with diverted run-on flows.

8.11.4 Cover System

This component provides frost protection to the cap composite liner and, after seeding, protects the surface of the CAMU Phase 2 Cell from erosion. It consists of 6 inches of seeded topsoil overlying 24 inches of subsoil. The project specifications require the organic rich topsoil to be salvaged and stockpiled separate from the underlying subsoil to ensure a proper medium for seeding with grasses. The combination of cover system and SWCR provides a total of 3.5 feet of frost protection to the cap composite liner. The CAMU cover has been designed with a top slope of 3 percent and fairly flat side slopes of 5:1 to resist erosion and minimize maintenance.

9.0 WASTE SAMPLING AND ANALYSIS

Asarco's engineering consultant in coordination with the contractor shall implement the components of the waste sampling and analysis. The waste sampling and analysis section of the Work Plan is designed to assess representative samples of waste being hauled and placed in the CAMU Phase 2 Cell. This section provides the methodology and procedures for each sampling and analysis task. The collection of representative samples and characterization of waste being hauled to the CAMU Phase 2 Cell will conduct the follow tasks:

- Description of payload inside sampled trucks,
- Photo-documentation the truck payload,
- Grab sampling of wood, dirt, dust, brick, and concrete materials, and
- Laboratory analyses of collected grab samples.

9.1 SAMPLING FREQUENCY AND PROCEDURES

The cleaning and demolition waste being hauled to the CAMU Phase 2 Cell for disposal will be sampled from the payload of the haul truck, after the haul truck has been weighed but prior to the haul truck leaving the Asarco facility. The payload of each truck will be recorded and a photograph will be taken.

During Work Plan implementation, four work areas will have demolition material removed and transported to the CAMU Phase 2 Cell. These work areas are presented in Table 9-1. The materials being hauled to the CAMU Phase 2 Cell from cleaning activities are not included in Table 9-1, as quantities of these materials cannot be determined. The work area designations are based on the contractors schedule for demolition, processes that occurred in these areas, and the materials used to construct the buildings. A sample will be collected from one out of every 20 trucks hauling waste from each work area. At least one sample will be obtained from each of the four areas for every 20 haul trucks that transport waste from that area to the CAMU Phase 2 Cell. The CSHB ventilation system and stack are mainly composed of metal. The majority of the material should be recyclable. If non-recyclable material is hauled from this area to the CAMU Phase 2 Cell, one sample will be collected

from every 20 haul trucks, assuming that the material being hauled is not metal. In addition, samples will be collected from waste generated by cleaning activities if the material is not containerized within the haul truck. No samples will be collected from materials generated from cleaning activities if the load is bagged and sealed in plastic.

TABLE 9-1. MATERIAL VOLUMES AND ESTIMATED SAMPLES

2009 Work Plan Work Areas	Material Volume (cubic yards)	Number of Haul Trucks (assume 15 yards/truck)*	Minimum Number of Samples (1/20 trucks)**
Sample Mill, Crushing Mill, Soil Pile by Sample/ Crushing Mill, Hopto Pad, Storage Bins, and Conveyor Gallery, Acid Dust Facility.	7100	474	24
Sinter Stockpile Building, Highline Railroad, Abandoned and New Breaking Floor, Groundwater Sump.	1,370	92	5
Concentrate Storage and Handling Building Ventilation System	0	0	0
400' D&L Stack, 200' Acid Stack, 425' Blast Furnace Stack	20662	1378	69
Total	**29,132**	**1,944**	**98**

Number of haul trucks assumes a 15 cubic yard capacity. Alternative truck haul capacities may be used by the contractor (typically a range of 10 cubic yards to 20 cubic yards).
The actual number of samples may vary based on the capacity of the haul trucks used and the number of truck loads. The number of samples will be adjusted to the actual number of truckload transported to the CAMU.

Each haul truck payload to be sampled will be divided into five areas. A grab sample shall be collected at a random location within each of the five areas. If, based upon Asarco's engineering consultant's determination, a location within a sampling area can be visually identified to be potentially the worse case for that area, the sample will be obtained from that location to bias the sample. If, based on Asarco's engineering consultant's judgment, it is not possible to identify a worse case location, the sample will be obtained from a random location. All five samples will be combined into one composite sample and mixed thoroughly. This composite sample will be forward to the laboratory for analyses.

A sampling notebook shall include the location and work area where waste is being hauled from, a description of the materials in the haul truck payload, the sample identification

number, and the date and time the sample is taken. A photograph of the truck payload will also be collected.

9.2 LABORATORY PROCEDURES

Laboratory analysis will be performed for total metals using analytical methods shown in Table 9-2.

TABLE 9-2. CAMU SOILS ANALYTICAL PARAMETER LIST

Parameter	Analytical Method[(1)]	Practical Quantitation Limit (mg/Kg)
Total Metals — Digestion by EPA Method 3050 (Method 7471 for Mercury)		
Aluminum (Al)	6010B/6020	5
Antimony (Sb)	6010B/6020	5
Arsenic (As)	6010B/6020	5
Barium (Ba)	6010B/6020	5
Beryllium (Be)	6010B/6020	5
Cadmium (Cd)	6010B/6020	1
Chromium (Cr)	6010B/6020	5
Cobalt (Co)	6010B/6020	5
Copper (Cu)	6010B/6020	5
Iron (Fe)	6010B/6020	5
Lead (Pb)	6010B/6020	5
Manganese (Mn)	6010B/6020	5
Mercury (Hg)	7471	1
Nickel (Ni)	6010B/6020	5
Selenium (Se)	6010B/6020	5
Silver (Ag)	6010B/6020	5
Thallium (Tl)	6010B/6020	5
Vanadium (V)	6010B/6020	5
Zinc (Zn)	6010B/6020	5

NOTES: (1) Laboratory analytical methods are ICP and ICP-MS techniques from EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*.

10.0 FINAL CLEANING

10.1 FINAL CLEANING ACTION

The contractor shall be responsible for conducting the final cleaning procedures outlined in this Work Plan section. The final cleaning of the Work Plan areas will involve a three-phased approach. First, all exposed concrete footprints including all material staging and processing areas will undergo a rough cleaning using conventional scraping and shoveling methods. Although this cleaning technique provides an efficient method for removing residual materials, it cannot achieve the prescribed level of cleanliness. To supplement conventional cleaning methods, the concrete footprint will be mechanically swept. The use of the mechanical sweeper will remove surface materials that may not be completely removed using conventional cleaning techniques. Finally, the concrete footprint will be cleaned using a high-velocity vacuum. This final cleaning method will remove any fine material, particularly along the interfaces between the concrete floor and building columns, fan foundations, and support walls. Final cleaning will be deemed complete when no process materials are visible, as determined by MDEQ representatives.

Once demolition is complete and the debris has been removed, a final inspection of the floor footprint of the demolished structures will be conducted. Asarco's engineering consultant shall conduct a visual survey to catalog any area within the structure footprints where concrete is not present and underlying soils may have been exposed to elevated metal bearing materials. The survey will document the condition of concrete within the structures and floors. The documentation will include a description and photographs. All exposed soil areas, broken or severely cracked concrete areas will be mapped and recorded on plan views of the demolished structures. All areas with exposed soils will be sampled in accordance with Section 11.0 of this Work Plan.

11.0 EXPOSED SOIL SAMPLING

Asarco's engineering consultant shall be responsible for the soil sample collection tasks outlined in this Work Plan section. Soil samples will be collected from designated areas where exposed soils are present within the demolition footprint. As part of site surveys conducted in 2007, exposed soil areas within or adjacent to cleaning and demolition footprint areas were identified in the field and mapped. Prior to conducting the exposed soil sampling procedures, visually obvious dust (typically indicated by dark gray or black color and fine-grained, silty texture) within demolition footprint areas will be removed by the contractor. Asarco's engineering consultants shall conduct soil sampling and the contractor will provide personnel and equipment to conduct the test pit excavation. In 2009, a total of seven samples shall be collected. The sample locations are shown in red on Sheet 10 in Appendix B.

11.1.1 Exposed Soil Area Sampling Methods

The identified exposed surface soil areas that will be encountered within the cleaning and demolition footprints shall be sampled and analyzed for the following indicator parameters: arsenic, copper, cadmium, lead, zinc and selenium, and supplemental parameters: aluminum, antimony, barium, beryllium, chrome, cobalt, iron, manganese, mercury, nickel, silver, thallium and vanadium using wet chemistry standard EPA methods. The soil sample collection and analytical matrix is summarized in Table 11-1.

11.1.1.1 Initial Exposed Surface Soil Characterization

A total of five surface (0 - 4" increment) soil samples shall be collected from each sample site in identified exposed soil areas and composited into one representative sample of the area. Surface soil samples will be collected using hand tools (hand shovels, trowels, or hand augers). The samples will be stored in ziploc bags and archived for analysis. All analytical work will be conducted before the 6-month holding time limit for metals. The location of each soil sampling site will be cataloged using sample numbers and GPS coordinates. A photograph of each sample site will be taken. The sampling Standard Operation Procedures (SOPs), analytical parameters, and methods are summarized in Table 11-1.

TABLE 11-1. DEMOLITION FOOTPRINT UNPAVED EXPOSED AREA SOIL SAMPLE COLLECTION AND ANALYTICAL MATRIX

Sample Location	Purpose	Sample Types and Depth Intervals[1]	Number of Sampling Events	Sampling Standard Operating Procedures	Analytical Parameters	Methods	Project Detection Limit Goal	Comment
Speiss-Dross and Thaw House Area (Area 1) (15 Sites) **Direct Smelt and Shop Area Cleaning and Demolition** (Area 6) (1 Sites) **Crushing Mill and Sample Mill Area** (Area 5) (3 sites) **Former Zinc Shop and Meeting Room Area** (Area 7) (4 sites)	Remove dust and impacted soils in exposed or unpaved areas within the structure demolition foot print.	Sample from Excavator Bucket. Sample intervals: 0-4" 4"-12" 1'-2' 2'-4' 4'-6' 6'-8' 8'-10' 10'-12' 12'-15'	1	HF-SOP-2 HF-SOP-4 HF-SOP-5 HF-SOP-7 HF-SOP-29 HF-SOP-31 HF-SOP-58 HS-SOP-6 HS-SOP-13 HS-SOP-57	Indicator Parameters (5) (All Depth Increments) As Cd Cu Pb Zn Se Supplemental Parameters (13) (Initial and Final Depth Increments Al Sb Ba Be Cr Co Hg Fe Mn Ni Ag Tl V	ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 EPA SW7471 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020 ICP/ICP-MS EPA SW6010/6020	5 ppm 1 ppm 5 ppm 5 ppm 5 ppm 5 ppm 5 ppm 5 ppm 5 ppm 0.05 ppm 5 ppm 5 ppm 5 ppm 5 ppm 5 ppm 5 ppm	Test pit sampling continues until the practical excavation limit is reached. Practical excavation limits are defined as: - Limit of common excavation equipment - 15 feet - Excavation equipment refusal because of hard strata or large boulders, - Entering the water table where caving strata do not allow advancement of test pit sampling to a depth of 15 feet. The final sample increment is retained and analyzed by wet chemistry for Indicator Parameters, Supplemental. Parameters and SPLP.
	Document metal concentrations in test leachate from the SPLP testing procedure	Final increment sampled from excavator bucket and sampled for metals	1		As Cd Cu Pb Zn Se	SPLP (EPA 1312) SPLP (EPA 1312) SPLP (EPA 1312) SPLP (EPA 1312) SPLP (EPA 1312) SPLP (EPA 1312)	0.1 mg/l 0.1 mg/l 0.1 mg/l 0.1 mg/l 0.1 mg/l 0.1 mg/l	

(1) Sample depths are approximate; actual depths will based on field conditions.
Duplicates will be collected at a minimum frequency of 1 per 20 field samples. Duplicates for SPLP analysis will be submitted at a frequency of 1 per 20 samples selected for SPLP.
Detection limits for SPLP analysis have been set at 100x below regulatory limits.
Sample site locations will be surveyed by GPS during or after samples are collected.

The surface soil samples shall be collected from exposed soil areas using the same techniques and procedures used for Interim Measures (IM) and RCRA Facility Investigation (RFI) activities, as described in the IM and RFI Work Plans (Hydrometrics, 1999b and Hydrometrics, 2000).

11.1.1.2 Exposed Soil Subsurface Profile Sample Collection

The exposed area sub-surface soil profile samples will be collected at the depth intervals shown in Table 11-1 and analyzed for the indicator parameters arsenic, cadmium, copper, lead, zinc and selenium. Samples shall be collected from test pits advanced using standard excavation equipment. The test pits will be advanced to standard excavation practical limits of 15 feet or until equipment refusal is encountered. Excavator equipment refusal is defined by the inability to advance the excavation in the event of encountering the groundwater table, or in the event hard boulder strata conditions prohibit the ability of the excavator to advance the test pit.

The test pit subsurface soil samples will be analyzed using standard EPA wet chemistry methods (EPA Methods SW 6010/6020) at a commercial laboratory. The final interval samples will also be submitted to a commercial laboratory for definitive analysis using standard EPA wet chemistry methods.

The soil sample collection and analytical matrix is summarized in Table 11-1. As the table shows, initial and final samples will be analyzed for indicator parameters (As, Cd, Cu, Pb, Se, and Zn) and for supplemental parameters (Al, Sb, Ba, Be, Cr, Co, Hg, Fe, Mn, Ni, Ag, Tl, and V). The final sample increment will also be analyzed using the Synthetic Precipitation Leachate Procedure (SPLP).

Sub-surface soil samples will be collected directly from the soil excavation equipment bucket in the following increments. Sub-surface soil increments are: 4 - 12”, 1 - 2’, 2 - 4’, 4 - 6’, 6 - 8’, 8 - 10’, 10 - 12’, and 12 - 15’. One soil sample will be collected directly from the backhoe bucket for each increment within an identified exposed soil sample area.

Sub-surface soil samples will be collected from exposed soil areas using the same techniques and procedures used for Interim Measures (IM) and RCRA Facility Investigation (RFI) activities, as described in the IM and RFI Work Plans (Hydrometrics, 1999b and Hydrometrics, 2000). Samples will be stored in ziploc bags and shipped to the laboratory for analysis.

12.0 PLUG AND ABANDON UNDERGROUND UTILITIES

The contractor shall be responsible for plugging and abandoning underground utilities outlined in this Work Plan section and is responsible for coordinating this task with Asarco's engineering consultant. Underground piping and structures exist within the footprint in which demolition will take place. The underground piping and structures will be plugged and sealed in place once demolition is complete but prior to final grading and the interim cap being installed. The utility locates shall be performed by the contractor and compared with the utility drawings and underground utility information provided by Asarco to identify as many underground utilities as possible. The underground utility maps provided by Asarco are included as Sheets 11 and 12 in Appendix B. The abandoned underground utilities that shall be flow filled are illustrated on Sheet 13 in Appendix B.

Utility piping larger than 6 inches in diameter will be flushed with water and blown out with air to ensure flow within the pipes. The contractor should anticipate that some utilities/piping may contain some residual material (e.g. plant water, residual pipe sediment, sewage) from previous activities and will need to take necessary precautions in the handling and disposal of any such materials. The water collected from the flushing of the underground utilities will first be routed to Asarco's on-site car wash thickener building for solids separation and then to Asarco's WTF. Large solids (if any) will be dried at the car wash thickener building prior to placement in the CAMU Phase 2 Cell. Any fine sediment (if any) that pass through the car wash thickener process will be managed in the sediment handling system of Asarco's WTF and transported off-site for disposal. Sediment that may be present in the ferrous-containing plant water pipe and plant water return lines will be comprised primarily of rust. Further characterization of the sediments removed from the flushing of the underground utilities will not take place but will be managed as previously described.

All existing underground utilities (e.g. piping conduits, fire plugs, or sumps) will be plugged/capped and abandoned in place along their entirety utilizing flow fill or other approved material. Flowable fill or control density fill (CDF) shall be used as a low strength,

self consolidating fill material for confined spaces which can be easily excavated at a later time. CDF is characterized by a high maximum slump of 8 inches. CDF shall consist of Portland Cement, aggregates, water, and fly ash. Chemical admixtures and other mineral admixtures may be used. The actual mix proportions and flow characteristics shall be determined by the producer of the CDF to meet site conditions. In all piping systems, the flow fill will be introduced using pressure not to exceed 100 psi. The grouting will continue at the inlet of the underground utility until a steady flow of grout exits the pipe outlet. The outlet will be sealed then the inlet will be grouted under pressure using a pressure between 50 and 100 psi.

One 4-foot diameter groundwater sump exists within the demolition footprint near the abandoned breaking floor building as shown on Sheet 13 in Appendix B. This sump is 14.5 feet deep and shall be abandoned. This sump was used to dewater the Direct Smelt Building and was never used as a monitoring well. The sump does not need to be abandoned under the State of Montana well abandonment regulations. Once the sump is clean and the above ground section is demolished, it will be filled with flowable fill to grade.

13.0 INTERIM CAPPING

The contractor shall be responsible for conducting the interim capping outlined in this Work Plan section. The areas where above grade demolition activities have been completed shall be sealed in a manner that will mitigate the infiltration of water. This section outlines the backfilling, grading, capping, and maintenance procedures involved with installing and maintaining interim caps.

13.1 BACKFILL LOCATIONS AND FUMED SLAG COMPOSITION

Once final cleaning activities are complete, certain areas may be graded and, as necessary, backfilled to achieve proper drainage prior to placement of an interim cap. The contractor shall use on-site fumed slag as backfill. The fumed slag may be placed in areas that are below grade or require drainage assistance. The fumed slag will serve as the subgrade for the interim cap, over which an engineered cap comprised of non-woven geotextile and RPE will be placed. The fumed slag has been used as a grading material at the plant site in the past and possesses good physical characteristics for fill or sub-foundation uses (granular material and compacts wells). Although fumed slag contains elevated total metal concentrations, the metals are bound in a silicate-iron matrix with characteristics of low metal leachability. The potential for metal migration from the fumed slag is low. In response to EPA's July 6, 2006 comments, Asarco provided the rationale for using fumed slag for backfilling purposes, including study results derived from the RCRA Consent Decree investigations. In April 2005, Department representatives collected fumed slag samples from the East Helena Plant to assess the potential environmental impacts from its use as an iron substitute within the cement manufacturing industry. A July 2006 Department Environmental Impact Statement (EIS) contains additional slag related information.

Most, but not all of the footings or similar structures encountered during the implementation of the Work Plan will be brought to grade. Most of the concrete, asphalt slabs, and some interior wall and/or footings will remain in place. The presence of above ground concrete, asphalt, walls, or footings will not compromise nor impair the ability to achieve proper

drainage. The areas adjacent to these elevated structures will be contoured with fumed slag. This practice will minimize abrupt edges, facilitate the ability to place the interim cap, and reduce the potential for future liner damage.

Regardless of these efforts, the integrity of the cap may be affected by excessive wind or other condition beyond our control. The placement of additional sandbags and tethered vehicle tires over problematic cap areas will be employed to address liner displacement issues. On-going maintenance and repair of the interim cap will be employed.

13.2 LOCATION OF INTERIM CAPS

Once the required backfilling has occurred, certain areas shall be capped to control drainage and potential infiltration from precipitation and run-on within the newly exposed footprints or any other areas impacted by the demolition project. The described capping is considered a precautionary, interim measure. The capping techniques, procedures, and materials are designed to control drainage, potential infiltration, and run-on until the final cover system is constructed. Although the capping program is interim, it is possible that many of the features such as placement of the fill material and interim caps will remain in place even after a final remedy is implemented. Sheet 14 and 15 in Appendix B illustrates the areas in which interim capping will be placed following the Work Plan implementation.

13.3 INTERIM CAP TECHNIQUES, PROCEDURES AND MATERIALS

The demolition areas where above and below grade demolition activities has occurred shall covered as illustrated on Sheet 14 and 15 in Appendix B. The interim cap shall be comprised of a 10-oz geotextile and a geomembrane cap of 24-mil RPE liner.

In general, from the top down, the interim cap will consist of the following:

- Sand bags and/or tethered tires to secure the interim cap,
- A 24-mil reinforced polyethylene (RPE) with the PRE seams overlapped 3 inches and sewn,

- A minimum 10-ounce non-woven geotextile,
- A prepared sub-grade consisting of fumed slag fill for grading purposes, and
- Existing soils, concrete slabs and/or concrete foundations.

Upon completion of the demolition operations, footprint soil sampling, and area clean-up, the contractor shall remove all debris and items from the slab that could possibly penetrate the geotextile and geomembrane. This includes, but is not limited to, protruding rebar, pipes, and sharp concrete. The contractor shall utilize the existing on-site fumed slag as fill material over the identified areas. This fumed slag will be placed and rough graded to create the positive drainage required per Sheet 14 and 15 in Appendix B. The fumed slag has been used as a grading material at the plant site in the past and possesses good physical characteristics for fill or sub-foundation uses (granular material and compacts wells). Once the slag fill is graded to allow for proper drainage, it shall be rolled with a smooth drum vibrating roller to create a smooth surface for temporary liner placement.

The geotextile and geomembrane shall be laid, seamed, and secured as detailed on Sheet 16 in Appendix B unless the contractor proposes alternative methods that are approved by Asarco. Additionally, sandbags will be placed intermittently within the center liner area to prevent the liner from being picked up by wind uplift or other forces. The contractor will warranty their work and may present alternative anchoring techniques acceptable to Asarco to ensure their warranty. The contractor will be responsible for all future repairs to the liner for a period of one year from the date of installation. As an added preventative measure, the contractor shall utilize sandbags made of UV Resistant 9-mil PE, which will provide superior UV resistance (compared to standard plastic woven sandbags) to prevent breakdown by sunlight. All sandbag openings shall be secured using heavy-duty zip ties.

13.4 MAINTENANCE OF INTERIM CAP

13.4.1 Site Inspection

Asarco shall conduct periodic inspections of the interim cap to ensure that the interim cap systems are performing adequately and to identify problems and provide proper maintenance

of interim cap systems. The inspection program will involve three types of inspections: (1) informal inspections, (2) periodic technical inspections, and (3) special inspections after extreme events.

The informal inspection is actually a continuing effort by on-site personnel, performed in the course of their normal duties. Periodic technical inspections and inspections after extreme events will be performed by onsite Asarco staff (or other technical representatives) familiar with the design and construction of the capping systems. The periodic technical inspection will be performed monthly to document the condition of the cap components. Special inspections are very similar to periodic technical inspections but are performed only after an extreme event such as a rare rainstorm, tornado, or earthquake.

The inspection of the interim cap system will typically involve walking the entire site in a systematic fashion that ensures a comprehensive review. If any problem or deficiency is found, the inspector should record the location on a field sketch. A complete description of the affected area, including all pertinent data (i.e., size of the area and other descriptive remarks such as exposed synthetic materials) should be recorded on the appropriate reporting forms. An accurate and detailed description of observed conditions will enable a meaningful comparison of conditions observed at different times.

Photographs may be helpful in documenting problems. Provisions should be made to keep a photographic log of problems, repairs, and general site conditions. This log will provide valuable information when evaluating the performance of the interim cap system and when planning repair strategies.

It is important to have a record of site conditions at various stages after capping. Good documentation will provide valuable information to help maintenance and repair planning. Inspection checklists to assist in the inspection and documentation procedures should be developed and modified as needed throughout the interim capping period. The checklist will (at a minimum) contain items to evaluate such as membrane condition, sand bag condition,

liner seams, liner/concrete attachments and site drainage. A copy of an example inspection form is attached in Appendix D.

13.4.2 Site Security

The interim cap will be contained within the fenced Asarco facility and will be kept secured so that people or animals do not disturb the interim cap. Site access by ongoing plant or demolition operations will be limited through the use of barricades, barrier tape, or temporary fencing. Plant personnel will advise contractors conducting site activities of access limits within or near capped areas.

13.4.3 Site Maintenance

As shown in Table 13-1, there are four different types of maintenance tasks listed by priority rather than by frequency. Table 13-1 is provided as a guide to prioritize the different types of maintenance activities in proper perspective. The different types of maintenance are also discussed in the following subsections.

TABLE 13-1. PRIORITY OF MAINTENANCE TASKS

Priority	Type of Maintenance	Description and Example
1	Emergency	A situation requiring immediate attention (for example, fire or flood).
2	Preventative	Scheduled inspection and minor repairs carried out during inspection (for example, cleaning of membrane liner).
3	Corrective	Corrective maintenance required as a direct result of scheduled inspection (for example, repair of torn membrane liner).
4	Housekeeping	Routine housekeeping of buildings and grounds (for example, disposal of debris and general housekeeping).

1. Emergency maintenance - Emergencies are situations arising unexpectedly that require urgent attention. Often, immediate response must be provided to avert potential serious damage. Provisions for emergency repair/damage control activities must therefore be in-place prior to the occurrence. Toward this end, an Emergency Contacts list will be prepared and kept current, and include local emergency response organizations, assigned maintenance personnel, and agency and owner representatives. Table 13-2 provides a partial list of emergency contacts.

2. Preventative maintenance - Preventative maintenance will be performed to extend the life of equipment and structures. With the exception of routine surveillance and inspections, preventative maintenance tasks should be scheduled in accordance with the recommendations of the material and equipment manufacturers. Scheduled inspection and maintenance of all site facilities will help ensure that potential problems are discovered and corrected before they become serious, as well as providing for the performance of periodically required upkeep. During routine inspections, the Asarco personnel should be alert for any abnormal conditions, which could indicate potential problems.

3. Corrective maintenance - Corrective maintenance consists of repair and other non-routine maintenance. Asarco personnel must always be ready to handle these tasks as the need arises. Corrective maintenance procedures should follow the equipment or material manufacturer's recommendations. In planning for the corrective maintenance, arrange for the assistance of an engineer or manufacturer's representative, if necessary.

4. Housekeeping - Maintaining well-kept facilities indicates pride on the part of the Asarco personnel, and provides for good and efficient operations. Well-kept property cultivates good neighbor relations with adjacent property owners. Housekeeping tasks may include collecting/disposing of litter or debris and maintaining access barriers.

TABLE 13-2. EMERGENCY NOTIFICATION CONTACTS AND PHONE NUMBERS

General Emergency Numbers	
Fire Department	911
Ambulance	911
Police	911
Facility Resources	
ASARCO LLC	
Blaine Cox (East Helena Smelter)	(406) 227-4098
Jon Nickel (East Helena Smelter)	(406) 227-4529
Other Resources	
U.S. EPA (24-hour emergency)	(206) 553-1263
Superfund/RCRA Hotline	(800) 424-9346
Hydrometrics, Inc.	(406) 443-4150

13.5 DEPARTMENTAL INSPECTIONS AND CONFIRMATION

Asarco will notify the Department within five (5) working days after removal of the material and demolition a specific process unit or areas has been completed. The purpose of this notification is to request that the Department, through its oversight authority, inspect and confirm that the cleaning activity has been performed in accordance with the Work Plan.

These notifications and inspections will allow the Department to document that Asarco has fulfilled all the conditions of the 2007 Order, of which the Work Plan is a part. The Comprehensive List of Process Units and Other Areas of Interest will be regularly updated after the Department inspects the process units or locations.

14.0 DEMOBILIZATION AND CONTRACT CLOSE-OUT

Following the completion of all field activities, the contractor shall clear the site of temporary construction facilities as well as the disconnection and removal of temporary power sources. All equipment mobilized to the jobsite throughout the project will also be removed. A site walk through will be conducted with the Asarco Project Management Team and contractor at the completion of demobilization. This site walk will be used to receive closeout of construction activities or identify "punch list items" to be addressed. Following the completion of field activities, the contractor shall submit to Asarco any documentation that had not previously been forwarded to Asarco on a weekly basis.

15.0 PROJECT OVERSIGHT

Asarco shall contract a engineering consultant to conduct the project oversight associated with the implementation of this Work Plan. Project oversight will include oversight of all activities outlined in this Work Plan to ensure the contractor meets all expectations and provisions. In addition, Asarco will hire third party independent oversight to perform quality assurance for the final cover system on the CAMU Phase 2 Cell.

16.0 REPORTING

Asarco will host weekly construction meetings in which the contractor, project oversight personnel, and Asarco will be present. The MDEQ and EPA are invited to attend these meetings. Asarco will notify the MDEQ and EPA of the time and location of the weekly meeting. Weekly construction meetings will include a review of work conducted the previous week, problems encountered, and scheduling for the following week. The contractor will be responsible for providing a weekly update and the following week's schedule. In addition to weekly construction meetings, Asarco will provide the MDEQ with quarterly reports and an annual report. At their request, MDEQ and EPA shall be provided copies of reports.

16.1 QUARTERLY REPORTING

Asarco intends to begin the work outlined in this Work Plan on or before May 1, 2009. Within 30 days after each calendar quarter (no later than July 31, 2009, October 31, 2009, and, if necessary, January 31, 2010), Asarco will submit quarterly reports that contain the following information:

a. A description of the portion of the Work Plan completed;
b. Summaries of all deviations from the approved Work Plan during the reporting period;
c. Summaries of all problems or potential problems encountered during the reporting period;
d. Projected work for the next reporting period;
e. Documentation of all shipments of recyclable material and hazardous waste off-site including shipping papers such as manifests (if required); and
f. Description of each shipment of reclaimed or recycled material made during the preceding quarter indicating how the material is managed, handled, or treated for recovery or recycling that demonstrates that it has value. The information to be submitted to the MDEQ and EPA in making a successful stewardship demonstration is: (1) acceptance criteria required by the receiving facility (expressed as a minimum

threshold of recoverable metals and maximum allowable toxic metals), (2) a demonstration that the receiving facility is in compliance with all applicable environmental requirements, (3) a copy of the contractual agreement between Asarco, its broker and the receiving facility, (4) the name of the state or provincial regulatory contact and facility contact.

Quarterly reports will not be required after submittal of the 2009 Work Plan Completion Report.

16.2 ANNUAL REPORTING

Within thirty (30) days, but, no later than March 31, 2010, after Asarco concludes that it has fully implemented the materials removal outlined in the 2009 Cleaning and Demolition Work Plan, Asarco shall submit a 2009 Work Plan Completion Report to the MDEQ. The contents of the Work Plan Completion Report will include:

a. A description of the cleaning efforts conducted;
b. If applicable, documentation of all shipments of recyclable materials and/or hazardous wastes;
c. Summaries of all problems or potential problems encountered during the reporting period; and
d. Certification that the Work Plan has been fully implemented.

Each month, Asarco submits certified progress reports to EPA, which discuss the actions taken by Asarco in achieving compliance with the Decree. These monthly reports will discuss progress in implementing the components of this Work Plan.

2009 CLEANING AND DEMOLITION PROGRAM

AND

2009 INTERIM MEASURES WORK PLAN ADDENDUM

ASARCO EAST HELENA PLANT

APPENDIX A

March 2009

COMPREHENSIVE LIST OF PROCESS UNITS AND OTHER AREAS OF INTEREST (AOIs) (January 2009)

Asarco East Helena Plant
Comprehensive List of Process Units and Other Areas of Interest (AOI)
Updated January 2009

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
NON-PRODUCTION AREAS				
Paint Shop	Not In Use	Not Required	Not Required	10/29/2003
Paint Storage Area	Storage	Not Required	Not Required	2/23/2004
Methanol Storage	Storage	Not Required	Not Required	10/29/2003
Motor Storage Shop	Storage	Not Required	Not Required	10/29/2003
High Lead Welding	Not In Use	Not Required	Not Required	10/29/2003
Sweeper Garage	Storage	Not Required	Not Required	10/29/2003
	Demolished in Fall 2007			
Laboratory	Storage	Yes	7/13/2004	2/23/2004
	Demolished November 2006			11/15/2006
Laboratory Storage	Storage	Not Required	Not Required	2/23/2004
	Demolished November 2006			11/15/2006
Sanitary Sewer Plant	Not In Use	Not Required	Not Required	10/29/2003
Acid Plant Shop	Storage	Not Required	Not Required	4/7/2004
	Demolished Fall 2008			
Carpenter Shop	Not In Use	Not Required	Not Required	10/29/2003
	Demolished Fall 2008			
Main Shop	Not In Use	Not Required	Not Required	10/29/2003
Pumphouse	In Use	Not Required	Not Required	
Sump by Pumphouse	In Use	No	Pending	
Auto Shop	Not In Use	Not Required	Not Required	10/29/2003
	Demolished Fall 2008			
Warehouse	Storage	Not Required	Not Required	4/7/2004
Warehouse Pad	Storage	Not Required	Not Required	4/7/2004
Warehouse Chemical Accum.	Storage	Yes	7/13/2004	4/7/2004
Powerhouse	In Use	Not Required	Not Required	4/7/2004
Blacksmith Shop	Not In Use	Not Required	Not Required	10/29/2003
Crane Shed	Not In Use	Not Required	Not Required	
Brick Shed	Not In Use	Not Required	Not Required	10/29/2003
Used Oil Storage	Not In Use	Not Required	Not Required	10/29/2003
	Demolished Fall 2008			
Hazardous Waste	Not In Use	Not Required	Not Required	10/29/2003
Accumulation at 97 Bins	Demolished Fall 2008			
97 Bins	Not In Use	Not Required	Not Required	10/29/2003
	Demolished Fall 2008			
Guzzler Vacuum System	In Use	Not Required	Not Required	4/7/2004
Contractor's Lunchroom	Demolished	Yes	Fall 2007	9/14/2007
Storage Garage	Demolished	Yes	Fall 2007	9/14/2007
Contractor's Changeroom	Demolished	Yes	Fall 2007	9/14/2007
Main Office	Demolished	Yes	Fall 2007	9/14/2007
Natural Gas Valve House	Demolished	Yes	Fall 2007	9/14/2007

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
TANKS				
Speiss Tank	Demolished	Yes	7/22/2003 8/8/2005 Fall 2006	8/28/2003 11/15/2006
Stormwater Tank	In Use	Yes	7/21/2003 and 8/16/2004	4/7/2004
Thornock Tank	In Use	Yes	7/22/2003	8/28/2003
Million Gallon Tanks	In Use	Yes	7/23/2003 and 8/15/2004 9/1/2005 (west)	4/7/2004
Clarified Water Tanks	In Use	Yes	Summer 2002	4/7/2004
Equalization Tank	In Use	Yes	Summer 2002	4/7/2004
Truck Scale Storm Sump	In Use	Yes	7/25/2003 and 8/19/2004 8/8/2005	4/7/2004
Truck Gate Storm Sump	In Use	Yes	7/21/2003	4/7/2004
Thawhouse Storm Sump	In Use	Yes	7/21/2003 8/8/2005	4/7/2004
Baghouse Storm Sump	In Use	Yes	7/25/2003 and 8/19/2004	
G-Pan Storm Sump	Under Cap	Yes	7/22/2003 and 8/20/2004 Fall 2006	4/7/2004 11/15/2006
Footnote: The schedule for cleaning all stormwater tanks and sumps is governed by the amount of sediment accumulation over a given period of time.				

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
ORE STORAGE AREAS				
Thawhouse Building	Demolished	Yes	Fall 2007	10/29/2003
Coverall Buildings - Barnum Building - Bailey Building	In Use Storage of Demolished Waste	 No	Vacuum/Wash-down in 2002 Prior to Lease Pending	10/29/2003 10/29/2003
	Additional cleaning following removal of waste material to CAMU			
Ringling Building	Not In Use	Yes	Summer 2002	10/29/2003
	Disassembled by URS			11/2008
Ore Storage Yard	In Use	Not Required	Not Required	4/7/2004
High Grade Building	Not In Use	Yes	Summer 2002	10/29/2003
Hopto Unloading Bins	Not In Use	Yes	Summer 2002	10/29/2003
Direct Smelt Building	In Use	Yes	Summer 2002	10/29/2003
Printed Circuit Board Process	Never Used	Not Required	Not Required	10/29/2003
Footnote: The Direct Smelt Building was used to store road sand, mobile equipment, accumulated HDS filter cake, and CAMU ACM prior to shipping for disposal.				

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
ORE RECEIVING				
Hopto Unloading Beltline	Not In Use	No	Pending	Not Conducted
Hopto Unloading Bin Walls	Not In Use	Not Required	Not Required	Not Conducted
Former Crushing Mill	Not In Use	Yes	Summer 1998	4/7/2004
Sample Mill	Not In Use	Not Required	Not Required	4/7/2004
Sample Mill Baghouse Hopper	Not In Use	Yes	8/12/2003	8/28/2003 and 4/7/2004
New Crushing Mill Office	Not In Use	Not Required	Not Required	10/29/2003
New Crushing Mill Floor	Not In Use	No		10/29/2003
New Crushing Mill Belts	Not In Use	No		10/29/2003
	Removed/Shipped Off-Site October 2008			
New Crushing Mill Baghouse Hopper	Not In Use	Yes	8/5/2003	8/28/2003 10/29/2003
CSHB Truck Bins	Not In Use	No		10/29/2003
A-Conveyor Belt	Not In Use	No		10/29/2003
A-Conveyor Belt Gallery	Not In Use	No		10/29/2003
A-Conveyor Ventilation Pipe	Not In Use	No		10/29/2003
Door to A-Conveyor Vent. Pipe	Not In Use	No		10/29/2003
CSHB Feeders	Not In Use	No		10/29/2003
CSHB Under Feeders	Not In Use	No		10/29/2003
CSHB Feeder Tops	Not In Use	No		10/29/2003
CSHB Tracks	Storage of Waste	No		10/29/2003
CSHB Main Bins	Not In Use	No		10/29/2003
CSHB Office	Not In Use	Not Required	Not Required	10/29/2003
CSHB Crane Decks	Not In Use	No		
CSHB Bin 13	Not In Use	Yes	Summer 2002	8/28/2003
CSHB Bin 14	Not In Use	No		10/29/2003
CSHB Bin 15	Not In Use	No		10/29/2003
CSHB Bin 16	Not In Use	Yes	6/26/2003	8/28/2003
CSHB North Baghouse Hopper	Not In Use	Yes	8/6/2003	8/28/2003
CSHB South Baghouse Hopper	Not In Use	Yes	8/7/2003	8/28/2003
CSHB Feeder Baghouse Hopper	Not In Use	Yes	8/11/2003	8/28/2003
No. 6 Baghouse Hopper	Not In Use	Yes	8/11/2003	8/28/2003
CSHB Stack Base	Not In Use	Found Clean	Not Required	8/28/2003
Dustmaster Tank	Not In Use	Yes	8/14/2003	8/28/2003
CSHB I-Bin	In Use Store waste	No	Pending	4/7/04,12/22/04 6/23/05, 9/1/05
Truck Scales	In Use	No	Pending	

Footnote: The CSHB (concentrate storage and handling building) and new crushing mill underwent extensive mechanical cleaning during the summers of 2001and 2002. Unfortunately, some of these areas have not been adequately cleaned to meet work plan criteria. Therefore, these areas are assumed to require additional cleaning.

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
SINTER PLANT				
Hammer Mill	Demolished	Yes	September 2006	10/29/03,11/15/06
B-Conveyor Belt	Demolished	Yes	September 2006	10/29/03,11/15/06
B-Conveyor Belt Gallery	Demolished	Yes	September 2006	10/29/03,11/15/06
Nodulizer	Demolished	Yes	September 2006	10/29/03,11/15/06
C-Belt Conveyor	Demolished	Yes	September 2006	10/29/03,11/15/06
Ignition Hopper	Demolished	Yes	September 2006	10/29/03,11/15/06
Feed Hopper	Demolished	Yes	September 2006	10/29/03,11/15/06
1st Deck Ventilation Pipe	Demolished	Yes	September 2006	10/29/03,11/15/06
Sinter Machine	Demolished	Yes	September 2006	10/29/03,11/15/06
Sinter Machine Access	Demolished	Yes	September 2006	10/29/03,11/15/06
Pallet Room	Demolished	Yes	September 2006	10/29/03,11/15/06
2nd Deck Cleanout Chutes (2)	Demolished	Yes	September 2006	10/29/03,11/15/06
2nd Deck Windboxes (11)	Demolished	Yes	September 2006	10/29/03,11/15/06
2nd Deck Ventilation Pipe	Demolished	Yes	September 2006	10/29/03,11/15/06
Fan Deck Oil Room	Demolished	Yes	September 2006	10/29/03,11/15/06
1A Pan	Demolished	Yes	September 2006	10/29/03,11/15/06
1 Pan	Demolished	Yes	September 2006	10/29/03,11/15/06
2 Pan	Demolished	Yes	September 2006	10/29/03,11/15/06
3 Pan	Demolished	Yes	September 2006	10/29/03,11/15/06
4 Pan	Demolished	Yes	September 2006	10/29/03,11/15/06
F-Belt Conveyor	Demolished	Yes	September 2006	10/29/03,11/15/06
F-Belt Conveyor Gallery	Demolished	Yes	September 2006	10/29/03,11/15/06
Elevator	Demolished	Yes	September 2006	10/29/03,11/15/06
G-Pan	Demolished	Yes	September 2006	10/29/03,11/15/06
E-Belt	Demolished	Yes	September 2006	10/29/03,11/15/06
Smooth Rolls	Demolished	Yes	September 2006	10/29/03,11/15/06
Spike Rolls	Demolished	Yes	September 2006	10/29/03,11/15/06
Returns Tank	Demolished	Yes	September 2006	10/29/03,11/15/06
Vibrating Conveyor	Demolished	Yes	September 2006	10/29/03,11/15/06
Sinter Storage Bin	Demolished	Yes	September 2006	4/7/2005 10/29/03,11/15/06
Coke Storage Bin	Demolished	Yes	September 2006	4/7/2005 10/29/03,11/15/06
Sinter Basement	Demolished	Yes	September 2006	10/29/03,11/15/06
Larry Pit	Demolished	Yes	September 2006	10/29/03,11/15/06
Numbers 1,2,3,4,and 5 Fan Housing	Demolished	Yes	September 2006	10/29/03,11/15/06

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
SINTER PLANT (continued)				
Weak Gas Ventilation Flue System	Demolished	Yes	September 2006	10/29/03,11/15/06
Strong Gas Ventilation Flue System	Demolished	Yes	Summer 2006	10/29/03,11/15/06
Baghouse Fan	Demolished	Yes	Summer 2006	10/29/03,11/15/06
Hot Cottrell Fan	Demolished	Yes	Summer 2006	10/29/03,11/15/06
Ignition Furnace Fan	Demolished	Yes	Summer 2006	10/29/03,11/15/06
Downdraft Fan	Demolished	Yes	Summer 2006	10/29/03,11/15/06
Cyclones	Demolished	Yes	Summer 2006	10/29/03,11/15/06
Crushing Circuit Ventilation System	Demolished	Yes	Summer 2006	11/15/06
No. 7 Baghouse Hopper	Not In Use	Yes	3/3/2003	8/28/2003
No. 8 Baghouse Hopper	Not In Use	Yes	3/3/2003	8/28/2003
Sinter Plant Baghouse Hoppers	Demolished	Yes	3/3/2003	8/28/03, 11/15/06
Sinter Storage Building Ledges, Roof, and Ventilation	Not In Use	Yes	9/15/2004	8/28/2003
Sinter Storage Building Floor	Not In Use	Yes	8/21/2003	8/28/2003
Stack Interior/Base	Not In Use	Yes	November 2007	

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
ACID PLANT				
Hot Cottrell Hoppers	Demolished	Yes	Fall 2006	8/28/03, 11/15/06
Hot Cottrell Building	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Hot Cottrell Inlet Header	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Hot Cottrell Outlet Header	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Scrubber Tower Ductwork	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Scrubber Towers	Demolished	Yes	3/5/03, Fall 2006	8/28/03, 11/15/06
Mist Precipitator Ductwork	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Mist Precipitator Base	Demolished	Yes	2/25/03, Fall 2006	8/28/03, 11/15/06
Mist Precipitator Floor Sump	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Pump Tanks	Demolished	Yes	Fall 2008	8/28/03, 11/15/06
Heat Exchangers	Demolished	Yes	Fall 2008	4/7/04
Tail Gas Ductwork	Demolished	Yes	Fall 2008	4/7/04
Tail Gas Stack Interior/Base	Not In Use	Yes	November 2007	4/7/2004
Acid Dust Bin/Building	Demolished	Yes	3/5/03, Fall '06	8/28/03, 11/15/06
93% Acid Storage Tanks	Demolished	Yes	Fall 2008	4/7/2004
93% Dry/Intermediate/Final Tower Tanks (3 Tanks)	Demolished	Yes	Fall 2008	4/7/2004 6/23/2005
98% Acid Storage Tank	Demolished	Yes	Oct./Nov. 2005	4/7/04, 11/15/06 6/23/2005 9/1/2005
Decolorization Acid Tanks	Demolished	Yes	Fall 2008	6/23/2005
Hydrogen Peroxide Tanks	Empty	Not Required	Not Required	4/7/2004
Converter Catalyst	Demolished	Yes	Fall 2008	4/7/2004
Acid Cooling Tower Base	Demolished	Yes	Fall 2008	4/7/2004
Acid Dust Recovery Building	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
80 Ton Dust Recovery Tank	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Hot Cottrell Access Piping	Demolished	Yes	Fall 2006	4/7/04, 11/15/06
Large Acid Storage Tanks	Empty	Yes	Fall 2005	
Footnote: The strong acid contained in acid plant storage vessels was removed during the fourth quarter 2005.				

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
BLAST FURNACE				
Matte Breaking Building (Old)	Not In Use	Yes	8/23/2005	10/29/03, 4/7/05 6/23/05, 9/1/05
Matte Breaking Building (New)	Not In Use	Found Clean	Not Required	10/29/03, 4/7/05
Sump by Breaking Floor	Not In Use	No	Pending	
Highline 47 Feeder Belts	Not In Use	Yes	10/11/2004	10/29/03, 4/7/05 6/23/2005
	Demolished	Yes	Summer 2007	9/14/2007
Highline 47 Open Bins	Not In Use	Yes	9/11/03,10/15/04	10/29/03, 4/7/05
	Demolished	Yes	Summer 2007	9/14/2007
Highline Storage Bins	Not In Use	Yes	Summer 2001	10/29/03, 4/7/05
	Demolished	Yes	Summer 2007	9/14/2007
Portland Cement Silo	Not In Use	Yes	9/3/2003	10/29/03,4/7/05
Blast Furnace Dust Silo	Not In Use	Yes	Summer 2001	4/7/2005
Blast Charge Floor	Not In Use	Yes	8/15/2004	10/29/03, 4/7/05
	Demolished	Yes	Summer 2007	9/14/2007
Scrap Conveyor	Demolished	Yes	9/20/2004	4/7/05, 6/23/05
Outside Blast Flue	Not In Use	Yes	10/20/2004	4/7/2005
	Demolished	Yes	Fall 2008	
Blast Feed Floor	Not In Use	Yes	11/10/2004	4/7/2005
	Demolished	Yes		9/14/2007
Blast Ventilation/Process Gas System	Not In Use	Yes	11/10/2004	4/7/2005
	Demolished	Yes	Summer 2007	9/14/2007
Blast Agglomerator Building	Demolished	Yes	8/26/2003	10/29/2003
Blast Agglomerator Feed Tank	Demolished	Yes	Summer 2001	10/29/2003
No. 1 Blast Tapping Floor	Not In Use	Yes	12/05/2004	10/29/03, 4/7/05 6/23/2005
	Demolished	Yes	Fall 2007	9/14/2007
No. 3 Blast Tapping Floor	Not In Use	Yes	12/05/2004	10/29/03, 4/7/05 6/23/2005
	Demolished	Yes	Fall 2007	9/14/2007
No.1 and 3 Crucible	Not In Use	Not Required	Not Required	4/7/2005 6/23/2005
	Demolished	Yes	Fall 2007	9/14/2007
Motor Switch Tracks	Not In Use	Yes	12/10/2004	4/7/2005 6/23/2005
No.1/3 Blast Furnace Flue	Not In Use	Yes	12/2005	6/23/05, 12/22/05,1/9/06
	Demolished	Yes	Fall 2007	9/14/2007
Blast Furnace Flue	Not In Use	Yes	Summer 2002	
	Demolished	Yes	Fall 2008	
Blast Furnace Flue Crossover	Not In Use	No		
	Demolished	Yes	Fall 2008	
Monier Flue at Baghouse Inlet	Not In Use	Yes	Third Qrt. 2005	6/23/2005,
	Demolished	Yes	Fall 2008	9/1/2005,9/16/05

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
BLAST FURNACE (continued)				
Blast Baghouse Cellars	Not In Use	Yes	Summer 2001	
	Demolished	Yes	Fall 2008	
Blast Baghouse Thimble Floor	Not In Use	No		
	Demolished	Yes	Fall 2008	
Blast Furnace Dust Cleanout Baghouse Hopper	Not In Use	No		
	Demolished	Yes	Fall 2008	
Blast Furnace Dust Cleanout	Not In Use	No		
	Demolished	Yes	Fall 2008	
Railroad Loadout Baghouse	Never Used	Not Required	Not Required	
Blast Stack Base	Not In Use	Yes	November 2007	

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
DROSS PLANT				
Speiss Long Pit	Demolished	Yes	Sum '02, Fall '06	6/23/05, 11/15/06
Speiss Short Pit	Demolished	Yes	Sum '02. Fall '06	6/23/05, 11/15/06
Under Reverb Furnace	Demolished	Yes	Fall 2006	6/23/05, 11/15/06
No. 4 Kettle Setting	Demolished	Yes	Fall 2006	6/23/05, 11/15/06
Under Kettle Floor	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Kettles	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Kettle Settings	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Ventilation System	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Lead Granulator	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Lead Granulator Belt	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Dross Furnace Upper Deck	Demolished	Yes	Fall 2006	11/15/2006
On Kettle Floor	Demolished	Yes	Fall 2006	11/15/2006
Dross Bullion Floor	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Speiss Pit Doors	Demolished	Yes	9/15/03, Fall '06	2/23/04, 11/15/06
Lead Pots	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Dross Reverb Furnace	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Dross Plant Crane Deck	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Dross Plant Floor	Demolished	Yes	Fall 2006	2/23/04, 11/15/06
Speiss Cleanout Bin	Demolished	Yes	Sum '02, Fall '06	2/23/04, 11/15/06
Router Dust Tank	Demolished	Yes	9/16/03, Fall '06	2/23/04, 11/15/06
Dross Plant Baghouse Hoppers	Demolished	Yes	2/24/2003 Fall 2007	2/23/04 9/14/2007
Dross Plant Stack	Demolished	Yes	9/15/2003 Fall 2007	2/23/04 9/14/2007

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
FORMER ZINC PLANT				
Tetrahedrite Drying and Baghouse	Demolished	Not Required	Not Required	4/7/2004 and 9/24/2004
Former Zinc Furnace	Demolished	Not Required	Not Required	4/7/2004
Former Zinc Furnace Retaining Wall	Cleaned & Demolished	Yes	11/23/2004	8/8/03, 4/7/04 9/24/04, 1/27/05
Zinc Plant Holding Furnace	Cleaned & Demolished	Yes	8/8/2005	6/23/2005 9/1/2005
Zinc Plant Balloon Flue	Cleaned & Demolished	Yes	10/24/2004	8/8/03, 4/7/04 9/24/04, 1/27/05
Zinc Plant Cooling Tubes	Cleaned & Demolished	Yes	10/30/2004	8/8/03, 4/7/04 9/24/04, 1/27/05
Zinc Plant Main Railcar Loadout	Cleaned & Demolished	Yes	11/12/2004	8/8/03, 4/7/04 9/24/04, 1/27/05
Zinc Plant Baghouse	Cleaned & Demolished	Yes	12/10/2004	8/8/03, 4/7/04 9/24/04,10/28/04 1/27/05
Zinc Plant Baghouse Bags	Cleaned & Demolished	Yes	7/13/2004	8/8/03, 4/7/04 9/24/04,10/28/04
Zinc Plant Loadout Building	Cleaned & Demolished	Yes	12/1/2004	8/8/03, 4/7/04 9/24/04, 1/27/05
Zinc Plant Stack	Demolished	Yes	1/24/2005	1/27/2005

Location	Operational Status	Has Cleanup Been Completed	Date of Cleanup and/or Demolition	State Inspection/ Confirmation
WATER TREATMENT				
Soda Ash Silo	Not In Use	No	Pending	
Scrubber Blowdown Recirculation Tanks	Not In Use	Yes	12/14/2004	1/27/2005
Scrubber Blowdown Clarifier	Not In Use	Yes	12/17/2004	1/27/2005
Soda Ash Tank and Feed System	Not In Use	Yes	12/10/2004	1/27/2005
Sludge Storage Tank	Not In Use	Yes	12/13/2004	1/27/2005
Sulfur Dioxide Stripper	Not In Use	Yes	12/16/2004	1/27/2005
Neutralization Building Tank	Not In Use	Yes	12/20/2004	1/27/2005
Neutralization Building Plate Clarifier	Not In Use	Yes	12/20/2004	2/23/2004 1/27/2005
Filter Press Water Holding Tank	Not In Use	Yes	12/22/2004	1/27/2005
Neutralization Building Surge Tank	Not In Use	Yes	12/22/2004	2/24/2004 1/27/2005
Filter Press Discharge Tank	Not In Use	Yes	12/8/2004	1/27/2005
HDS Water Treatment	In Use	Not Required	Not Required	2/23/2004
Sludge Recovery Operations	In Use	Not Required	Not Required	2/23/2004
Carwash Equipment Washdown	In Use	Not Required	Not Required	2/23/2004
HERO Facility	Never Used	Not Required	Not Required	2/23/2004
Spray Dry Building	Never Used Demolished	Not Required Yes	Not Required Fall 2008	2/23/2004

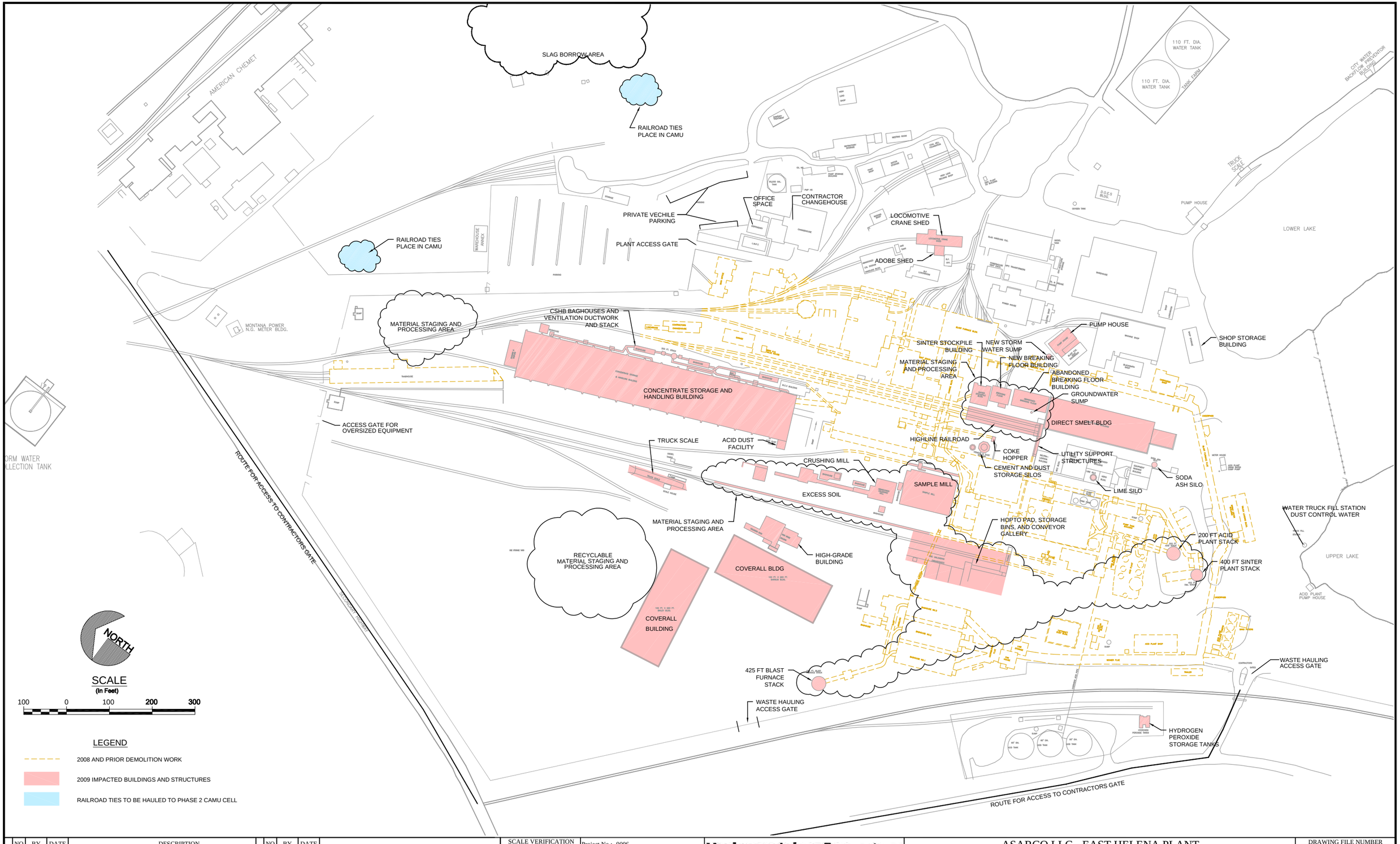
2009 CLEANING AND DEMOLITION PROGRAM
AND
2009 INTERIM MEASURES WORK PLAN ADDENDUM

ASARCO EAST HELENA PLANT

APPENDIX B

March 2009

PROJECT DRAWINGS



NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006		
DRAWN BY	JSD	1/23/09
CHECKED BY		
APPROVED BY		
SCALE: AS NOTED		

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(406) 443-4150

ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN

SITE PLOT PLAN

DRAWING FILE NUMBER	
900601H001	
AUTOCAD 2004 DRAWING (DWG)	
SHEET NUMBER	REV
2	△

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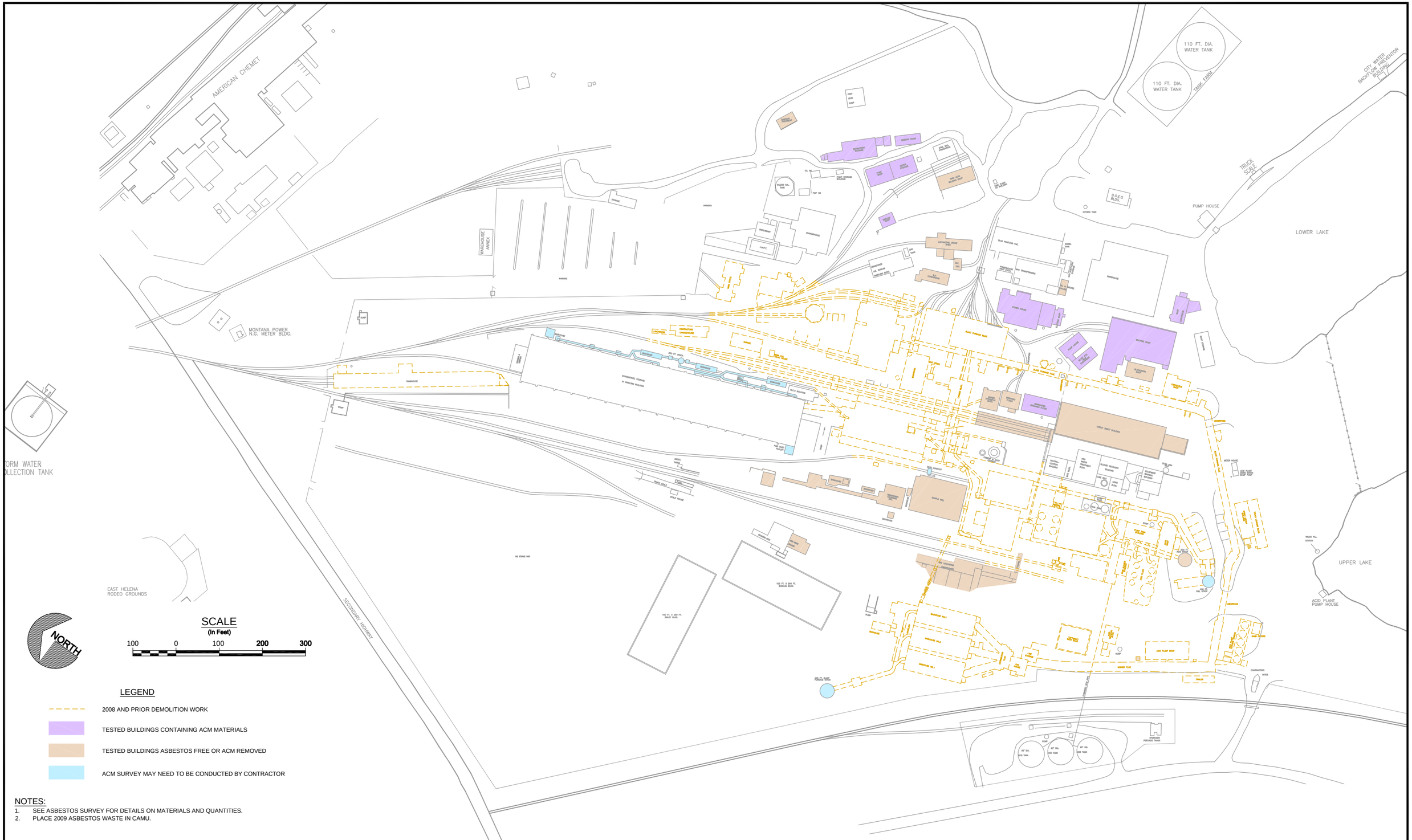

SCALE
(In Feet)

100 0 100 200 300

LEGEND

- 2008 AND PRIOR DEMOLITION WORK
- TESTED BUILDINGS CONTAINING ACM MATERIALS
- TESTED BUILDINGS ASBESTOS FREE OR ACM REMOVED
- ACM SURVEY MAY NEED TO BE CONDUCTED BY CONTRACTOR

NOTES:

1. SEE ASBESTOS SURVEY FOR DETAILS ON MATERIALS AND QUANTITIES.
2. PLACE 2009 ASBESTOS WASTE IN CAMU.

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

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Consulting Scientists and Engineers
Helena, Montana 59601
3020 Bozeman Avenue
(406) 443-4150

ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
ASBESTOS SURVEY LOCATION MAP

DRAWING FILE NUMBER
900601H003
AUTOCAD 2004 DRAWING (DWG)

SHEET NUMBER	REV
3	△

UPDATE TIME: 4:16 PM
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LOCOMOTIVE CRANE SHED, CLEAN ENTIRE STRUCTURE AND SURROUNDING LIME ROCK

ADOBE SHED, CLEAN ENTIRE STRUCTURE

PUMP HOUSE, CLEAN ENTIRE STRUCTURE

STORMWATER SUMP, CLEAN ENTIRE STRUCTURE

CONCENTRATE STORAGE AND HANDLING BUILDING, CLEAN ENTIRE STRUCTURE

DIRECT SMELT BUILDING, CLEAN ENTIRE STRUCTURE

CEMENT AND DUST SILOS, REMOVE BAGS FROM BAGHOUSE AND CLEAN ENTIRE STRUCTURE

COKE HOPPER

CLEAN UTILITY SUPPORT TOWERS

SODA ASH SILO, REMOVE BAGS FROM BAGHOUSE AND CLEAN ENTIRE STRUCTURE

LIME SILO, REMOVE BAGS FROM BAGHOUSE AND CLEAN ENTIRE STRUCTURE

TRUCK SCALE, CLEAN ENTIRE AREA AND UNDER TRUCK SCALE

HIGH-GRADE BUILDING, CLEAN ENTIRE STRUCTURE AND SURROUNDING AREA

PLACE CLEAN CEMENT BARRIERS HERE

COVERALL BUILDINGS, CLEAN AND REMOVE CEMENT BARRIERS AND CLEAN ENTIRE STRUCTURE

HYDROGEN PEROXIDE TANKS, CLEAN TANKS

NOTES:

1. TRANSPORT LUBRICATING OILS AND TRANSFORMER OILS (NON PCB) LOCATED THROUGHOUT THE CLEANING AND DEMOLITION AREA TO THE SHOP STORAGE BUILDING AND PLACE IN THE USED OIL TANK. THEY ARE NOT APPROVED FOR PLACEMENT IN THE CAMU.
2. FOLLOW PROPER PROTOCOL (MSDS PROCEDURES) WHEN HANDLING AND TRANSPORTING ANY HAZARDOUS MATERIAL.
3. REMOVE ALL DUST AND LEAD RESIDUE FROM BUILDINGS PRIOR TO DEMOLITION OF THESE STRUCTURES IN ORDER TO MINIMIZE DUST. THIS TASK WILL REQUIRE VACUUMING.

LEGEND

2008 AND PRIOR DEMOLITION WORK

CLEANING OF BUILDINGS AND STRUCTURES NOT SCHEDULED FOR DEMOLITION

NORTH

SCALE (In Feet)

75 0 75 150 225

NO	BY	DATE	DESCRIPTION	REVISIONS	NO	BY	DATE	

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
BUILDINGS AND STRUCTURES FOR CLEANING ONLY

DRAWING FILE NUMBER
900601H002
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 4
REV

UPDATE TIME: 4:15 PM
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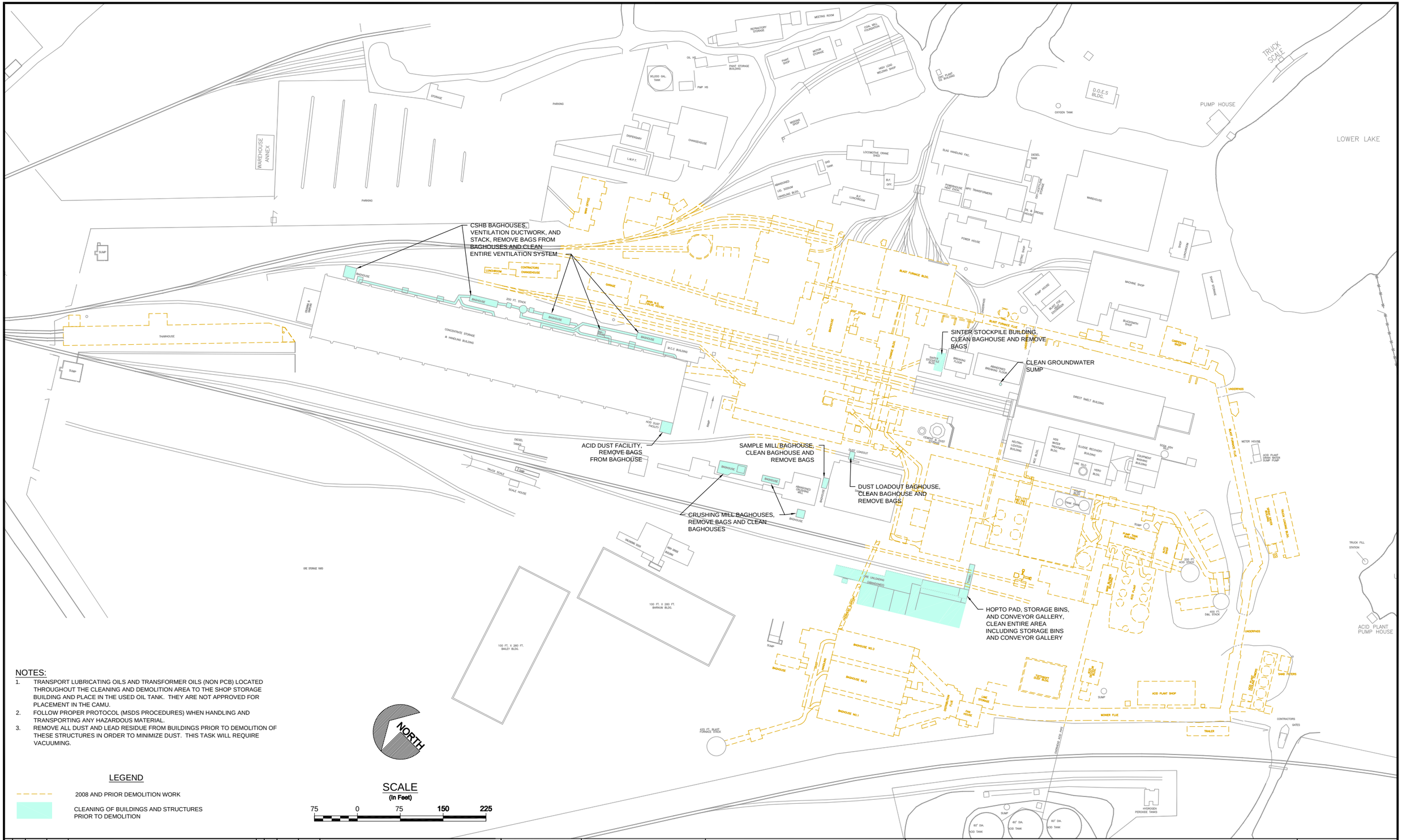

NOTES:

1. TRANSPORT LUBRICATING OILS AND TRANSFORMER OILS (NON PCB) LOCATED THROUGHOUT THE CLEANING AND DEMOLITION AREA TO THE SHOP STORAGE BUILDING AND PLACE IN THE USED OIL TANK. THEY ARE NOT APPROVED FOR PLACEMENT IN THE CAMU.
2. FOLLOW PROPER PROTOCOL (MSDS PROCEDURES) WHEN HANDLING AND TRANSPORTING ANY HAZARDOUS MATERIAL.
3. REMOVE ALL DUST AND LEAD RESIDUE FROM BUILDINGS PRIOR TO DEMOLITION OF THESE STRUCTURES IN ORDER TO MINIMIZE DUST. THIS TASK WILL REQUIRE VACUUMING.

LEGEND

2008 AND PRIOR DEMOLITION WORK

CLEANING OF BUILDINGS AND STRUCTURES PRIOR TO DEMOLITION

SCALE (In Feet)

75 0 75 150 225

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE	

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
BUILDINGS AND STRUCTURES FOR CLEANING PRIOR TO DEMOLITION

DRAWING FILE NUMBER
900601H002
AUTOCAD 2004 DRAWING (DWG)

SHEET NUMBER	REV
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UPDATE TIME: 4:15 PM
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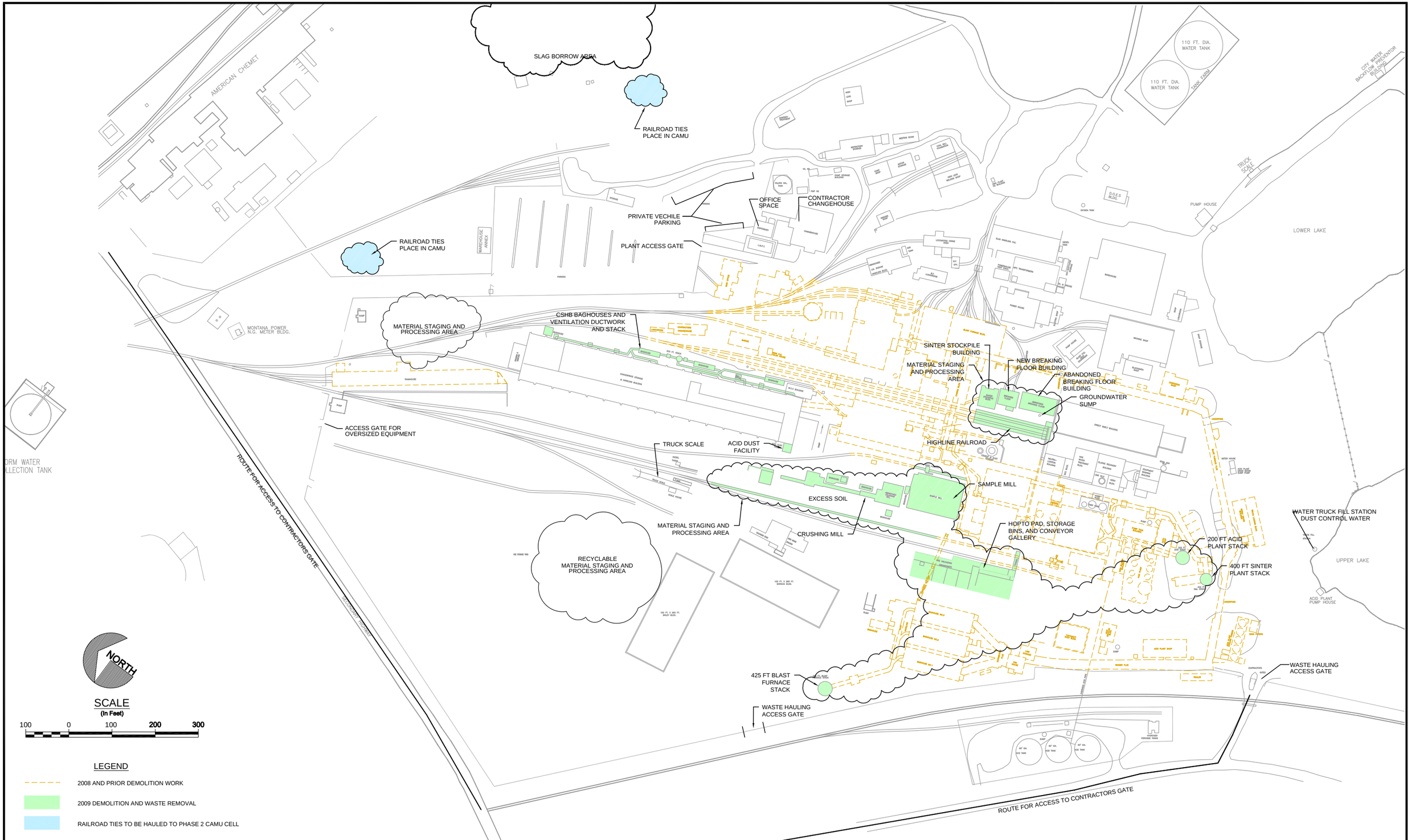

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REVISIONS

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
BUILDINGS AND STRUCTURES FOR DEMOLITION

DRAWING FILE NUMBER
900601H007
AUTOCAD 2004 DRAWING (DWG)

SHEET NUMBER	REV
6	△

UPDATE TIME: 2:54 PM
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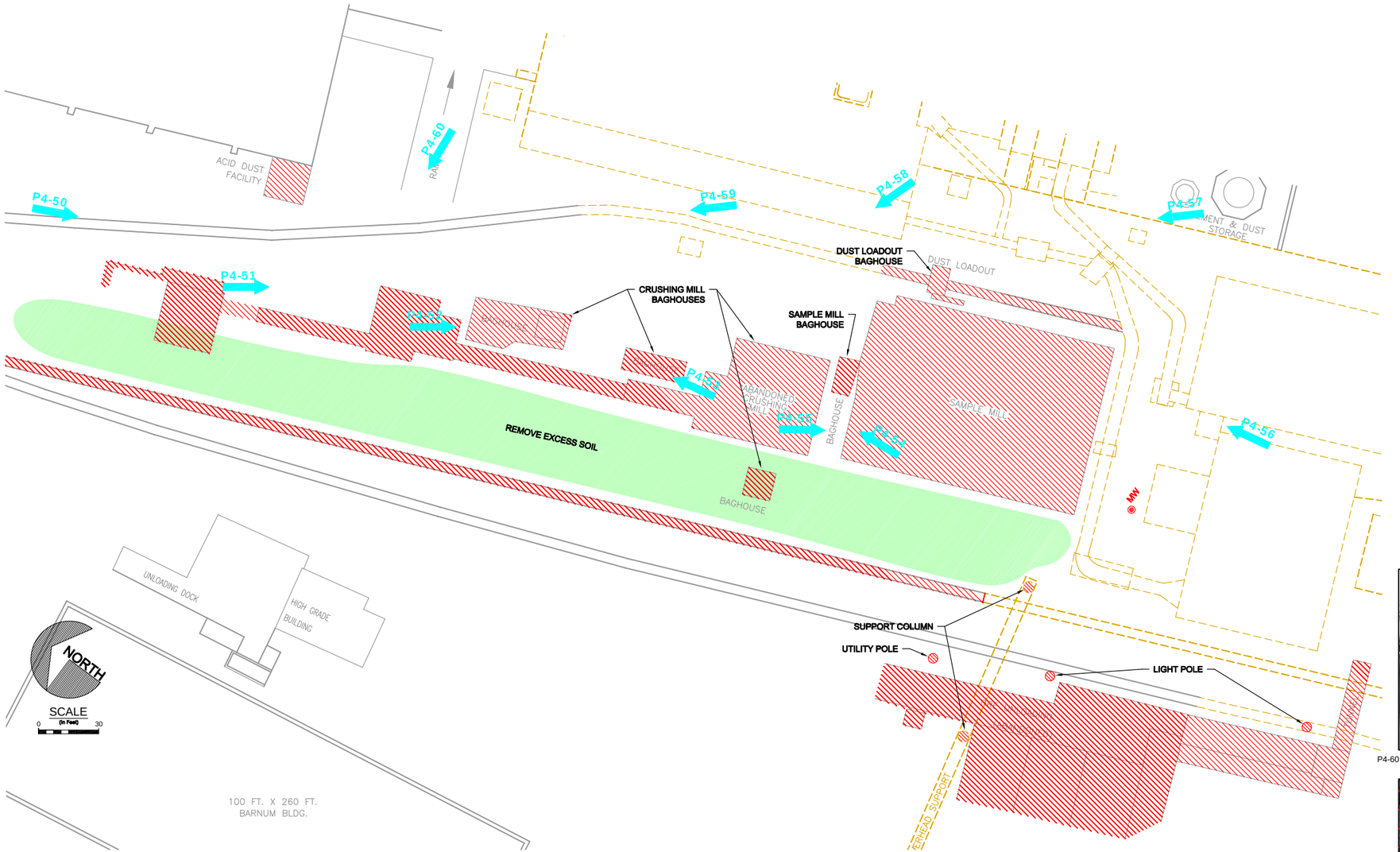
P4-50 NORTH SIDE OF CRUSHING MILL

P4-51 CRUSHING MILL & SUPPORT STRUCTURES

P4-52 WEST SIDE OF CRUSHING MILL

P4-53 WEST SIDE OF CRUSHING MILL



LEGEND

- 2008 AND PRIOR DEMOLITION WORK
- EXISTING STRUCTURES
- 2009 DEMOLITION WORK
- REMOVE EXCESS SOIL
- 4-63 PHOTO NUMBER AND VIEWING ANGLE
- MW MONITORING WELL - DO NOT DEMO

NOTES:

1. 2009 DEMOLITION STRUCTURES ARE MARKED WITH RED X'S AND STRUCTURES MARKED WITH BLACK X'S ARE TO BE LEFT UNDISTURBED.
2. IT MAY BE NECESSARY TO REMOVE PARTS OF TEMPORARY CAPS PRIOR TO DEMOLITION. ANY DAMAGED OR REMOVED TEMPORARY CAPS MUST BE REPLACED.
3. DEMOLISH STRUCTURES TO EXTERIOR GRADE UNLESS CONSTRUCTED OF BRICK.
4. DEMOLISH BRICK STRUCTURES TO 3 FEET BELOW GRADE.

P4-54 BAGHOUSE AND SOUTH SIDE OF CRUSHING MILL

P4-55 SAMPLE MILL

P4-56 SOUTH SIDE OF SAMPLE MILL

P4-57 EAST SIDE OF SAMPLE MILL & DUST LOAD OUT

P4-58 EAST SIDE OF CRUSHING MILL & BAGHOUSE

P4-60 CRUSHING MILL & STORAGE BUILDING

P4-59 EAST SIDE OF CRUSHING MILL & BAGHOUSES

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN

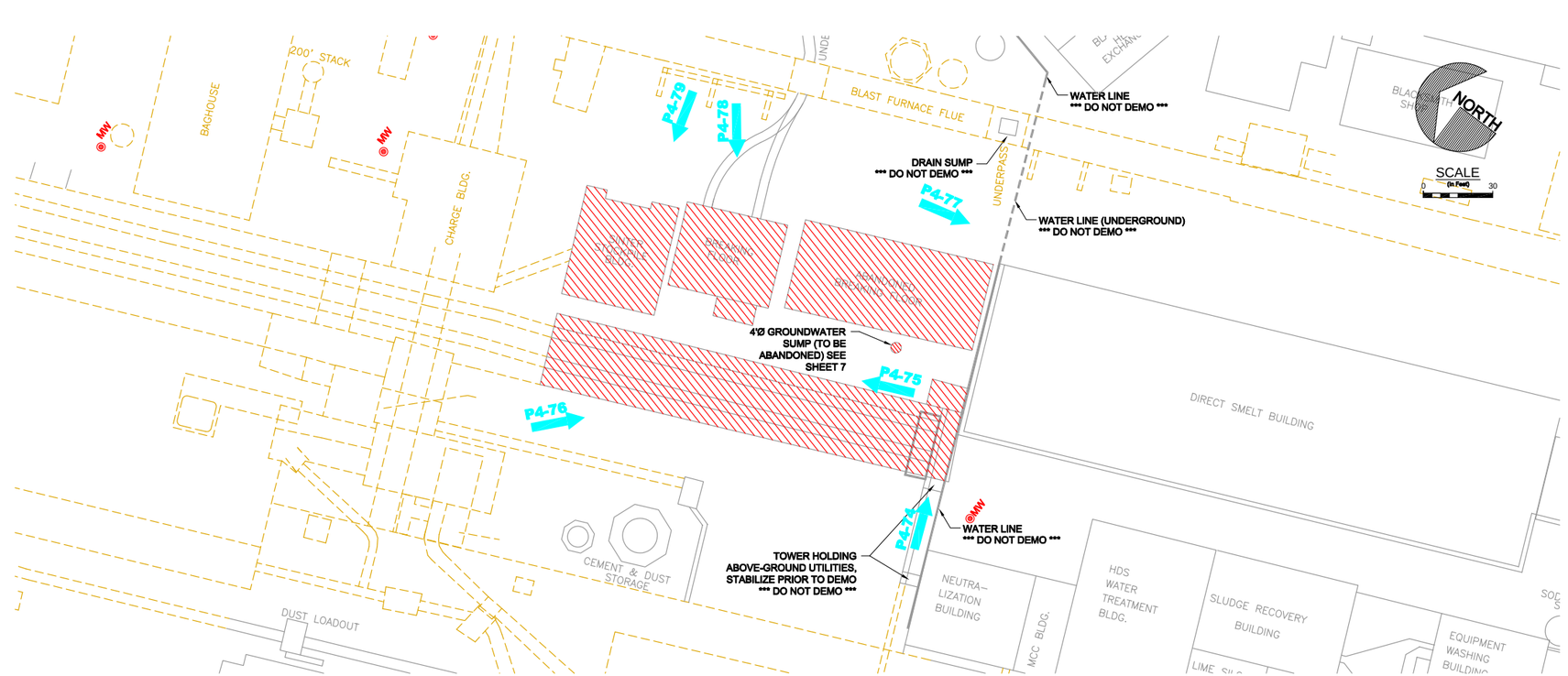
ACID DUST FACILITY, CRUSHING AND SAMPLE MILL AREA, AND HOPTO PAD, STORAGE BINS, AND CONVEYOR GALLERY

DRAWING FILE NUMBER	
900601H008	
AUTOCAD 2004 DRAWING (DWG)	
SHEET NUMBER	REV
7	△

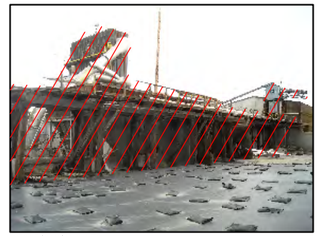
P4-77 ABANDONED BREAKING FLOOR & DIRECT SMELT

P4-78 BREAKING FLOOR

P4-79 SINTER STOCKPILE BUILDING



P4-75 LOOKING NORTH ALONG HIGHLINE



P4-76 HIGHLINE

P4-74

P4-80 425 FT BLAST FURNACE STACK

P4-81 200 FT ACID STACK AND 400 FT SINTER STACK

NORTH

SCALE
(In Feet)
50 0 50 100 150

LEGEND

- 2008 AND PRIOR DEMOLITION WORK
- EXISTING STRUCTURES
- 2009 DEMOLITION WORK
- P4-79 — PHOTO NUMBER AND VIEWING ANGLE
- MW — MONITORING WELL - DO NOT DEMO

NOTES:

1. 2009 DEMOLITION STRUCTURES ARE MARKED WITH RED X'S AND STRUCTURES MARKED WITH BLACK X'S ARE TO BE LEFT UNDISTURBED.
2. DEMOLISH STRUCTURES TO EXTERIOR GRADE UNLESS CONSTRUCTED OF BRICK.
3. DEMOLISH BRICK STRUCTURES TO 3 FEET BELOW GRADE.

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE	

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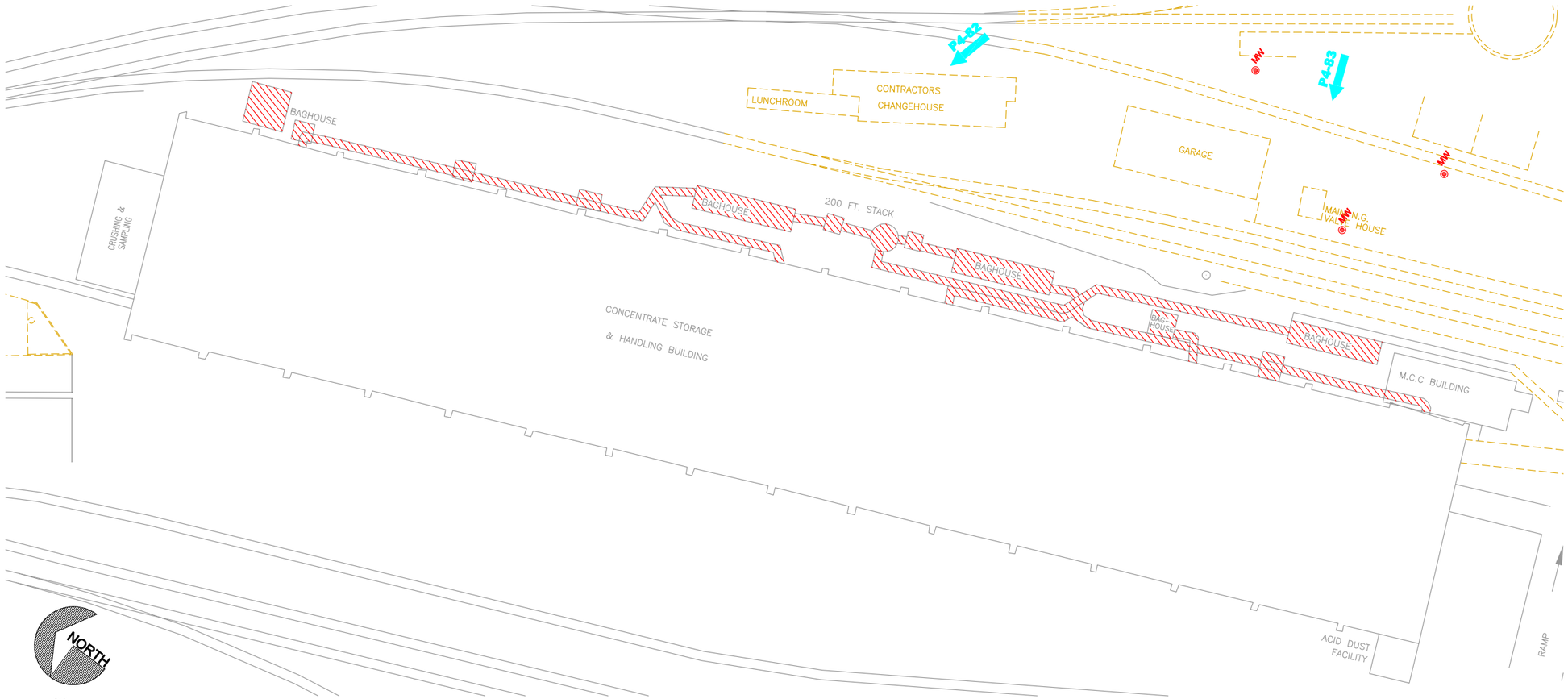
ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
HIGHLINE RAILROAD, SINTER STOCKPILE, BREAKING FLOOR BUILDINGS, SINTER PLANT STACK, BLAST FURNACE STACK, AND ACID PLANT STACK

DRAWING FILE NUMBER
900601H009
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 8
REV △



LEGEND

- 2008 AND PRIOR DEMOLITION WORK
- EXISTING STRUCTURES
- 2009 DEMOLITION WORK
- P4-82 — PHOTO NUMBER AND VIEWING ANGLE
- MW — MONITORING WELL - DO NOT DEMO

NOTES:

1. 2009 DEMOLITION STRUCTURES ARE MARKED WITH RED X'S AND STRUCTURES MARKED WITH BLACK X'S ARE TO BE LEFT UNDISTURBED.
2. DEMOLISH STRUCTURES TO EXTERIOR GRADE UNLESS CONSTRUCTED OF BRICK.
3. DEMOLISH BRICK STRUCTURES TO 3 FEET BELOW GRADE.

P4-82

P4-83

NO	BY	DATE	DESCRIPTION	REVISIONS	NO	BY	DATE	

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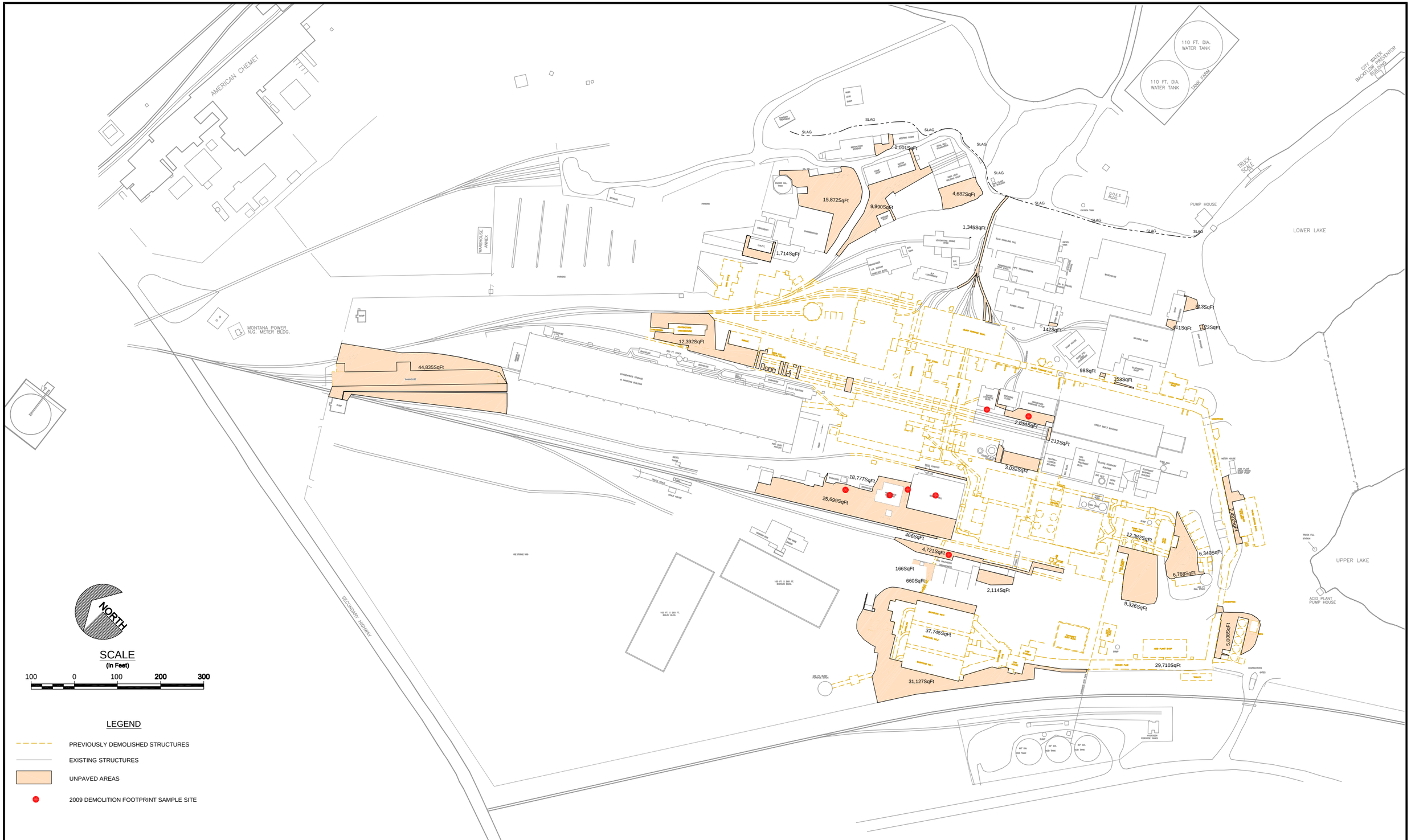
ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
CSHB BAGHOUSES AND VENTILATION DUCTWORK

DRAWING FILE NUMBER: 900601H015
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER: 9
REV: △



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REVISIONS

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
CLEANING & DEMOLITION FOOTPRINT EXPOSED SOIL SAMPLE AREAS

DRAWING FILE NUMBER
900601H013
AUTOCAD 2004 DRAWING (DWG)

SHEET NUMBER	REV
10	△

UPDATE TIME: 5:22 PM
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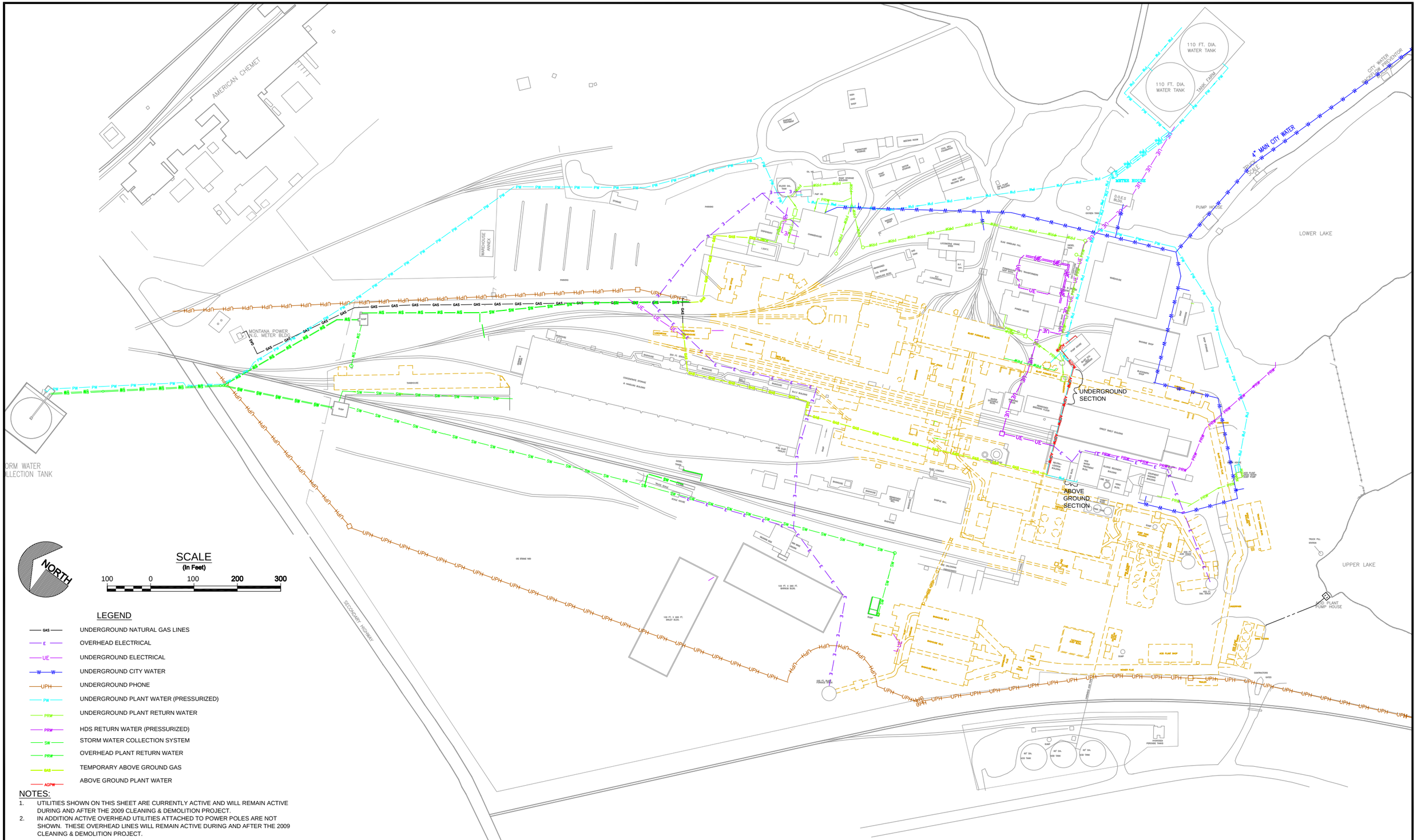

LEGEND

- GAS — UNDERGROUND NATURAL GAS LINES
- E — OVERHEAD ELECTRICAL
- UE — UNDERGROUND ELECTRICAL
- W — W — UNDERGROUND CITY WATER
- UPH — UNDERGROUND PHONE
- PW — UNDERGROUND PLANT WATER (PRESSURIZED)
- PRW — UNDERGROUND PLANT RETURN WATER
- PRW — HDS RETURN WATER (PRESSURIZED)
- SW — STORM WATER COLLECTION SYSTEM
- PRW — OVERHEAD PLANT RETURN WATER
- GAS — TEMPORARY ABOVE GROUND GAS
- AGPW — ABOVE GROUND PLANT WATER

NOTES:

1. UTILITIES SHOWN ON THIS SHEET ARE CURRENTLY ACTIVE AND WILL REMAIN ACTIVE DURING AND AFTER THE 2009 CLEANING & DEMOLITION PROJECT.
2. IN ADDITION ACTIVE OVERHEAD UTILITIES ATTACHED TO POWER POLES ARE NOT SHOWN. THESE OVERHEAD LINES WILL REMAIN ACTIVE DURING AND AFTER THE 2009 CLEANING & DEMOLITION PROJECT.

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
ACTIVE UTILITIES

DRAWING FILE NUMBER
900601H004
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 11
REV

UPDATE TIME: 1:59 PM
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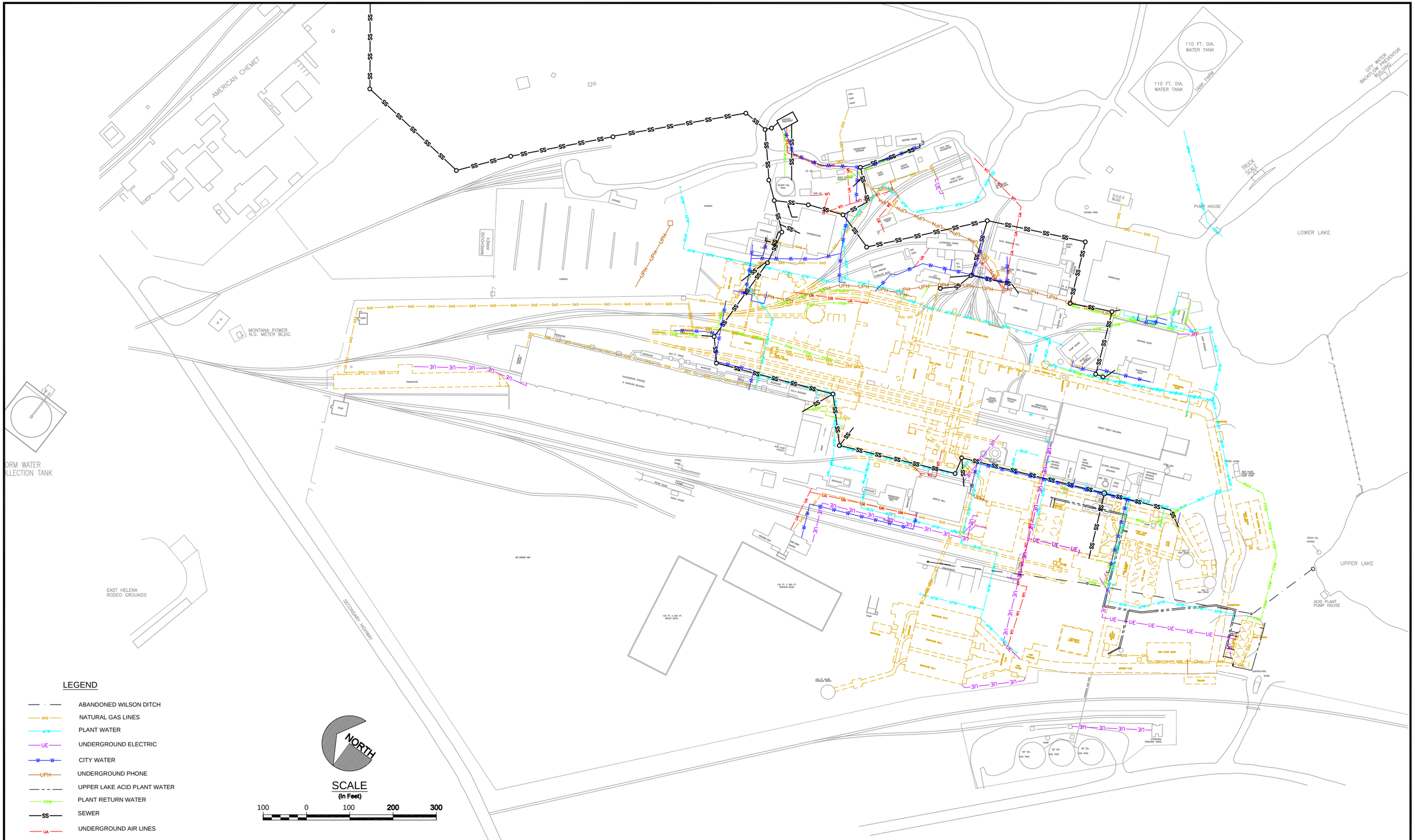

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
UNDERGROUND UTILITIES ABANDONED

DRAWING FILE NUMBER: 900601H005
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER: 12
REV: △

UPDATE TIME: 12:30 PM
LTABORSKY\HEL\20090312\I:\LAND PROJECTS\900601\DWG\900601H005.DWG

PHOTO 1

4'Ø BY 14 1/2' DEEP GROUNDWATER SUMP - DEMOLISH TO GRADE & FILL WITH FLOWABLE FILL

4"Ø GROUNDWATER SUMP, 14½" DEEP TO BE ABANDONED (SEE PHOTO 1)

SCALE
(In Feet)
50 0 50 100 150

LEGEND
- PHOTO VIEWPOINT AND NUMBER
- APW — PLANT WATER (6")
- SS — SEWER (6-10")

NOTES:
1. USE FLOWABLE FILL OR PRESSURE GROUT TO PERMANENTLY ABANDON ALL UTILITIES SHOWN ON THIS SHEET.
2. ONLY FILL THE SECTIONS OF UTILITY LINES SHOWN. THIS MAY INVOLVE SEALING OFF CONNECTING UTILITY LINES.

NO	BY	DATE	DESCRIPTION	REVISIONS	NO	BY	DATE

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Project No.: 9006

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APPROVED BY		
SCALE: AS NOTED		

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
UNDERGROUND UTILITIES TO BE FLOW FILLED

DRAWING FILE NUMBER
900601H006
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 13
REV

UPDATE TIME: 4:11 PM
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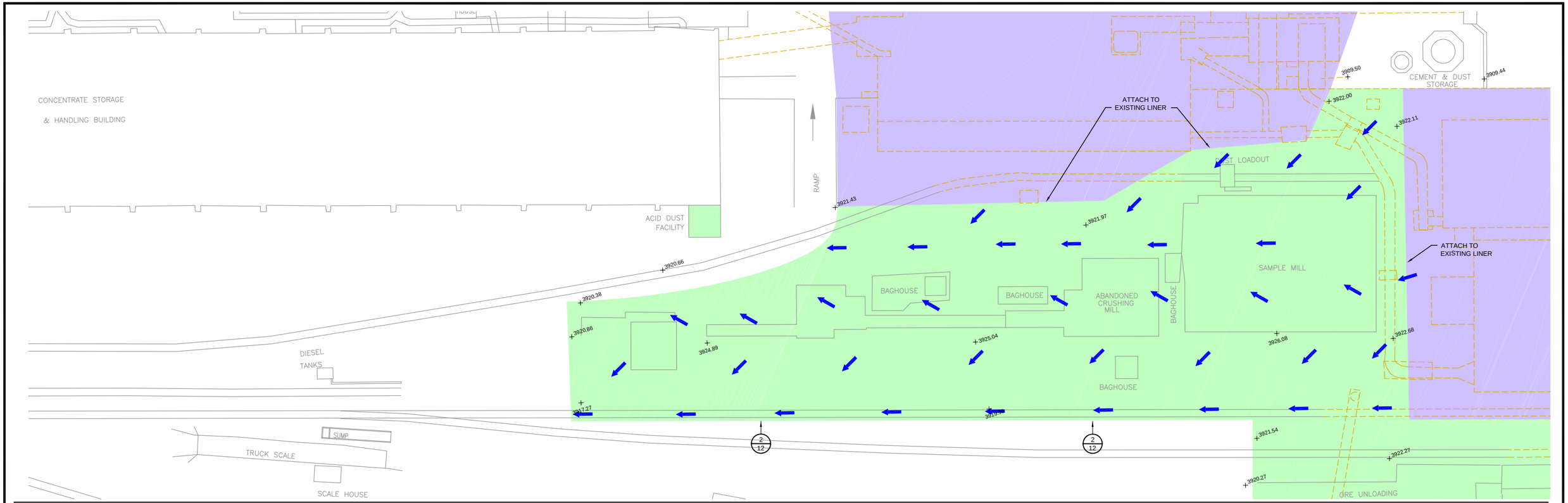

NOTES:

1. PREPARE SUBGRADE BY REMOVING ANY EXPOSED METAL OR SHARP OBJECTS.
2. USE FUMED FINE SLAG OR OTHER MATERIAL SUITABLE AS ON-SITE BORROW TO BRING LOW AREAS AND DEPRESSIONS UP TO A GRADE THAT ENSURES DRAINAGE OF THE CAP TO THE SITE STORMWATER DRAIN SYSTEM.
3. OVERLAP NON-WOVEN GEOTEXTILE A MINIMUM OF 12 INCHES.
4. Z-FOLD AND STITCH REINFORCED POLYETHYLENE (RPE) GEOMEMBRANE AT ALL SEAMS.
5. IN AREAS WHERE LINERS WILL BUTT AGAINST CONCRETE FOUNDATIONS ATTACH WITH 2"X4" TREATED TIMBERS WRAPPED WITH AT LEAST ONE FULL WRAP IN THE LINER AND ANCHORED TO THE CONCRETE WITH CONCRETE ANCHOR BOLTS AS ADDITIONAL SUPPORT USE A SIKA-FLEX CAULK TO SEAL BETWEEN THE LINER AND THE CONCRETE.
6. CONTRACTOR IS RESPONSIBLE FOR THEIR OWN QUANTITY ESTIMATES.
7. COMPLETE MONITORING WELL EXTENSIONS IN ACCORDANCE WITH MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION (MDNRC) MONITORING WELL REGULATIONS AND BY A LICENSED MONITORING WELL CONSTRUCTOR. SEE DETAIL 10/14.
8. COMPLETE LINER JUNCTIONS AT MONITORING WELLS, POWER POLES, AND WATER LINES ACCORDING TO DETAIL 9/14.
9. GRADE TRANSITIONS BETWEEN EXISTING TEMPORARY CAPS AND 2008 TEMPORARY CAP LINERS SO THAT WATER IS ABLE TO FLOW OFF CAP WITHOUT PONDING. OVERLAP TRANSITIONS AS DESCRIBED IN NOTES 3 AND 4.
10. ENSURE CAP GRADE EXCEEDS 1.5%. CAPS EXCEEDING GRADES OF 30% REQUIRE CONTINUOUS LINES OF SANDBAGS ON 5' SPACING.

LEGEND

- 2008 AND PRIOR DEMOLITION WORK
- EXISTING STRUCTURES
- SURFACE WATER DRAINAGE FLOW IN CAPPED AREAS
- 2009 TEMPORARY CAP
- 2008 AND PRIOR TEMPORARY CAP
- SURFACE WATER DRAINAGE INLET AREAS

NORTH

SCALE
(In Feet)
30 0 30 60 90

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

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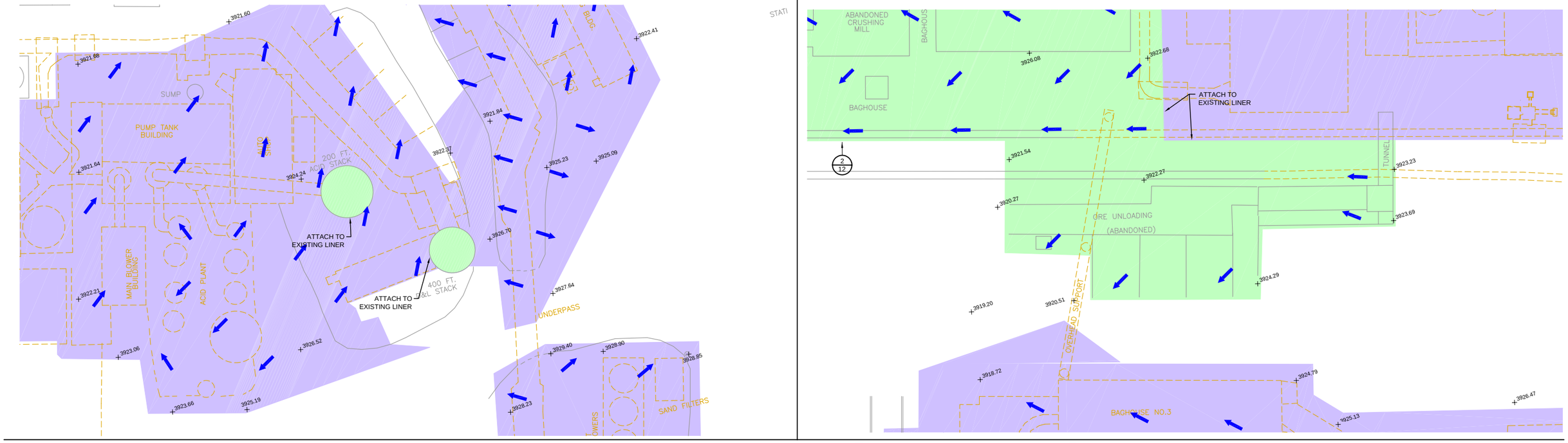
ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN
2009 COVER SYSTEM AND INTERIM CAP PLAN

DRAWING FILE NUMBER
900601H010
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 14
REV △



NOTES:

1. PREPARE SUBGRADE BY REMOVING ANY EXPOSED METAL OR SHARP OBJECTS.
2. USE FUMED FINE SLAG OR OTHER MATERIAL SUITABLE AS ON-SITE BORROW TO BRING LOW AREAS AND DEPRESSIONS UP TO A GRADE THAT ENSURES DRAINAGE OF THE CAP TO THE SITE STORMWATER DRAIN SYSTEM.
3. OVERLAP NON-WOVEN GEOTEXTILE A MINIMUM OF 12 INCHES.
4. Z-FOLD AND STITCH REINFORCED POLYETHYLENE (RPE) GEOMEMBRANE AT ALL SEAMS.
5. IN AREAS WHERE LINERS WILL BUTT AGAINST CONCRETE FOUNDATIONS ATTACH WITH 2"X4" TREATED TIMBERS WRAPPED WITH AT LEAST ONE FULL WRAP IN THE LINER AND ANCHORED TO THE CONCRETE WITH CONCRETE ANCHOR BOLTS AS ADDITIONAL SUPPORT USE A SIKA-FLEX CAULK TO SEAL BETWEEN THE LINER AND THE CONCRETE.
6. CONTRACTOR IS RESPONSIBLE FOR THEIR OWN QUANTITY ESTIMATES.
7. COMPLETE MONITORING WELL EXTENSIONS IN ACCORDANCE WITH MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION (MDNRC) MONITORING WELL REGULATIONS AND BY A LICENSED MONITORING WELL CONSTRUCTOR. SEE DETAIL 10/14.
8. COMPLETE LINER JUNCTIONS AT MONITORING WELLS, POWER POLES, AND WATER LINES ACCORDING TO DETAIL 9/14.
9. GRADE TRANSITIONS BETWEEN EXISTING TEMPORARY CAPS AND 2008 TEMPORARY CAP LINERS SO THAT WATER IS ABLE TO FLOW OFF CAP WITHOUT PONDING. OVERLAP TRANSITIONS AS DESCRIBED IN NOTES 3 AND 4.
10. ENSURE CAP GRADE EXCEEDS 1.5%. CAPS EXCEEDING GRADES OF 30% REQUIRE CONTINUOUS LINES OF SANDBAGS ON 5' SPACING.

LEGEND

- 2008 AND PRIOR DEMOLITION WORK
- EXISTING STRUCTURES
- SURFACE WATER DRAINAGE FLOW IN CAPPED AREAS
- 2009 TEMPORARY CAP
- 2008 AND PRIOR TEMPORARY CAP
- SURFACE WATER DRAINAGE INLET AREAS

NORTH

SCALE (In Feet)

30 0 30 60 90

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006

DRAWN BY	----	2/23/09
CHECKED BY		
APPROVED BY		

SCALE: AS NOTED

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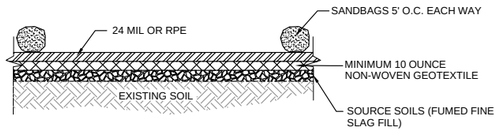
(406) 443-4150

ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN

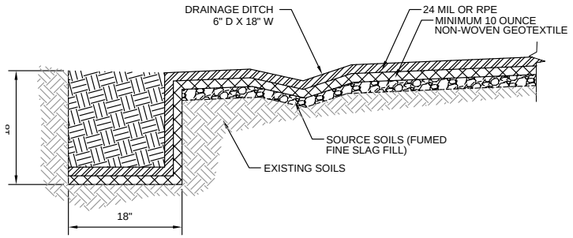
2009 COVER SYSTEM AND INTERIM CAP PLAN

DRAWING FILE NUMBER
900601H014
AUTOCAD 2004 DRAWING (DWG)

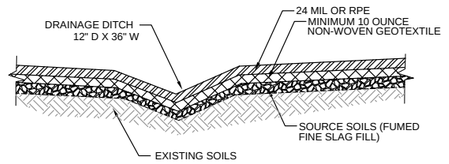
SHEET NUMBER	REV
15	△



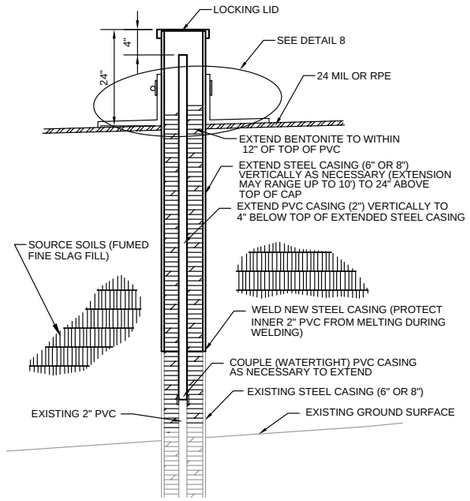
1 DETAIL
16 TEMP CAP
SCALE: NTS



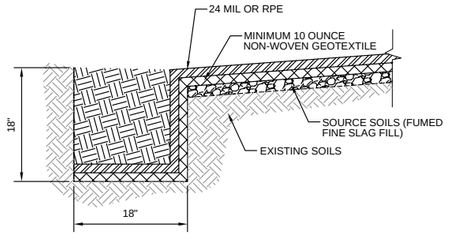
2 DETAIL
16 LINER ANCHOR TRENCH WITH DRAINAGE DITCH
SCALE: NTS



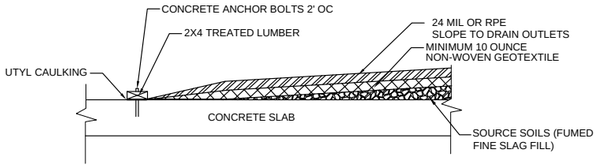
3 DETAIL
16 LINER DRAINAGE DITCH (TYP)
SCALE: NTS



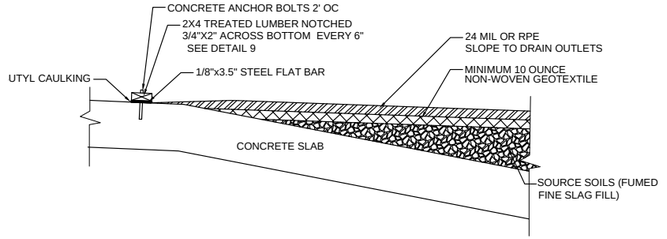
10 DETAIL
16 MONITORING WELL EXTENSION
SCALE: NTS



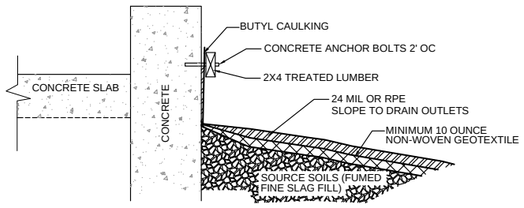
4 DETAIL
16 LINER ANCHOR TRENCH
SCALE: NTS



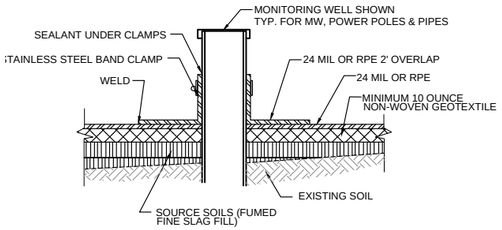
5 DETAIL
16 LINER CONCRETE ANCHOR
SCALE: NTS



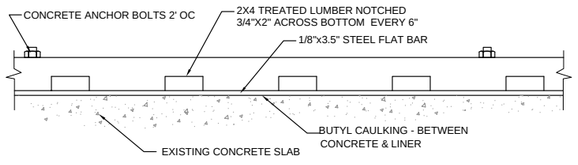
6 DETAIL
16 RUN-ON LINER/CONCRETE ANCHOR
SCALE: NTS



7 DETAIL
16 LINER WALL/FOUNDATION ANCHOR
SCALE: NTS



8 DETAIL
16 PROTRUSION & LINER CONNECTION (TYP)
SCALE: NTS



9 DETAIL
16 RUN-ON ANCHOR DETAIL
SCALE: NTS

NOTES:

1. THESE SUGGESTED DETAILS SHOW THE MINIMUM REQUIREMENTS AND ASARCO MAY ACCEPT ALTERNATIVE ANCHORING TECHNIQUES.
2. PERIMETER SANDBAGS SHALL BE TOUCHING SIDE BY SIDE.

NO	BY	DATE	DESCRIPTION

REVISIONS

NO	BY	DATE

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 1
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Project No.: 9006			
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SCALE: AS NOTED			

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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN

DETAILS

DRAWING FILE NUMBER	
900601H011	
AUTOCAD 2004 DRAWING (DWG)	
SHEET NUMBER	REV
16	△

UPDATE TIME: 5:07 PM
LTABORSKY\HEL\20090311\i:\LAND PROJECTS\900601\DWG\900601H011.DWG

2009 CLEANING AND DEMOLITION PROGRAM
AND
2009 INTERIM MEASURES WORK PLAN ADDENDUM

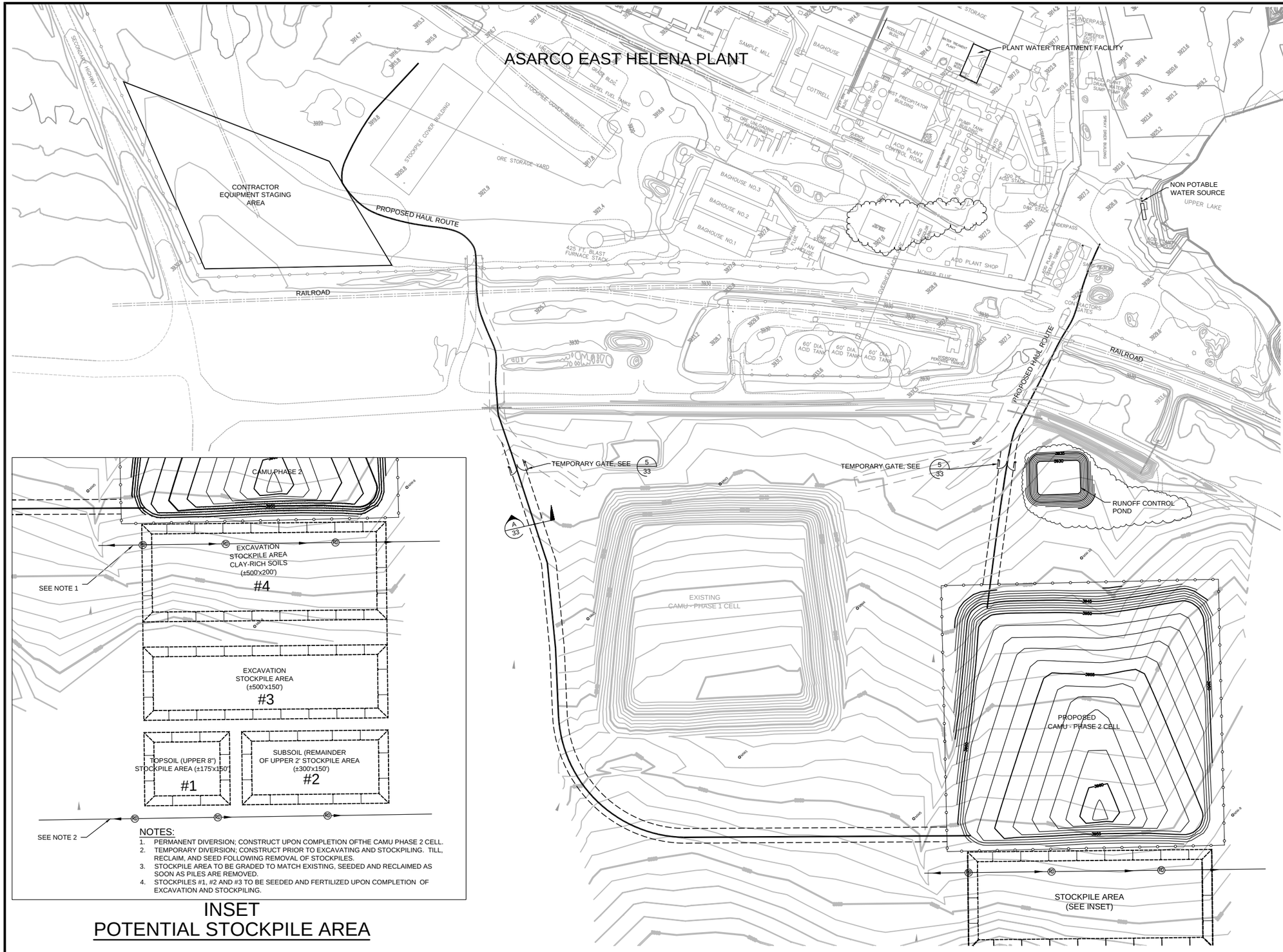
ASARCO EAST HELENA PLANT

APPENDIX C

March 2009

CAMU DESIGN DRAWINGS AND SPECIFICATIONS

ASARCO EAST HELENA PLANT



NOTES:
1. PERMANENT DIVERSION; CONSTRUCT UPON COMPLETION OFTHE CAMU PHASE 2 CELL.
2. TEMPORARY DIVERSION; CONSTRUCT PRIOR TO EXCAVATING AND STOCKPILING. TILL, RECLAIM, AND SEED FOLLOWING REMOVAL OF STOCKPILES.
3. STOCKPILE AREA TO BE GRADED TO MATCH EXISTING, SEEDED AND RECLAIMED AS SOON AS PILES ARE REMOVED.
4. STOCKPILES #1, #2 AND #3 TO BE SEEDED AND FERTILIZED UPON COMPLETION OF EXCAVATION AND STOCKPILING.

INSET
POTENTIAL STOCKPILE AREA

NORTH

SCALE
(In Feet)
100 0 100 200 300

LEGEND
- EXISTING ACCESS ROAD
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- GRADE BREAK
- NATURAL DRAINAGE SWALE
- ROAD CULVERT
- PROPOSED PAVED ACCESS ROAD
- RO — RUN-ON DIVERSION DITCH
- SDF — SEDIMENT CONTROL FENCE AND TEMPORARY SITE ACCESS CONTROL FENCE (ORANGE POLY FENCE)
- EXISTING CHAIN LINK FENCE
- CHAIN LINK FENCE/ WOVEN WIRE FARM FENCE

NOTES:
1. CONSTRUCT PAVED HAUL ROADS BETWEEN THE DEMOLITION AREA AND THE CAMU PHASE 2 CELL.
2. DRY VACUUM SWEEPERS TO BE RUN CONTINUOUSLY ON HAUL ROADS DURING HAULING.
3. EXISTING GATES PROVIDE ACCESS TO THE ASARCO EAST HELENA PLANT
4. EXCESS SOIL THAT REMAINS IN STOCK PILES FOLLOWING CAMU PHASE 2 CELL CONSTRUCTION WILL BE ADDED TO CAP SUBSOIL AND GRADED TO A SMOOTH, DRAINING SURFACE PRIOR TO PLACEMENT OF CAP TOP SOIL.
5. A WOVEN WIRE FARM FENCE WILL BE INSTALLED IN LIEU OF THE CHAIN LINK FENCING IN 2007 AND REMAIN UNTIL COMPLETION OF THE CAMU PHASE 2 CELL CAPPING.

REVISIONS	NO	BY	DATE	DESCRIPTION
	2	MWR	3/12/09	UPDATED CAP GRADING PLAN VIEW
	1	SDP	11/9/07	**MOVE RUNOFF CONTROL POND, REMOVE ADDATIVE ALTERNATIVE F**

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 1
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Project No.: 9006		
DRAWN BY	SDP	11/12/06
CHECKED BY	MWR	1/18/07
APPROVED BY	MJO	1/19/07
SCALE: AS NOTED		

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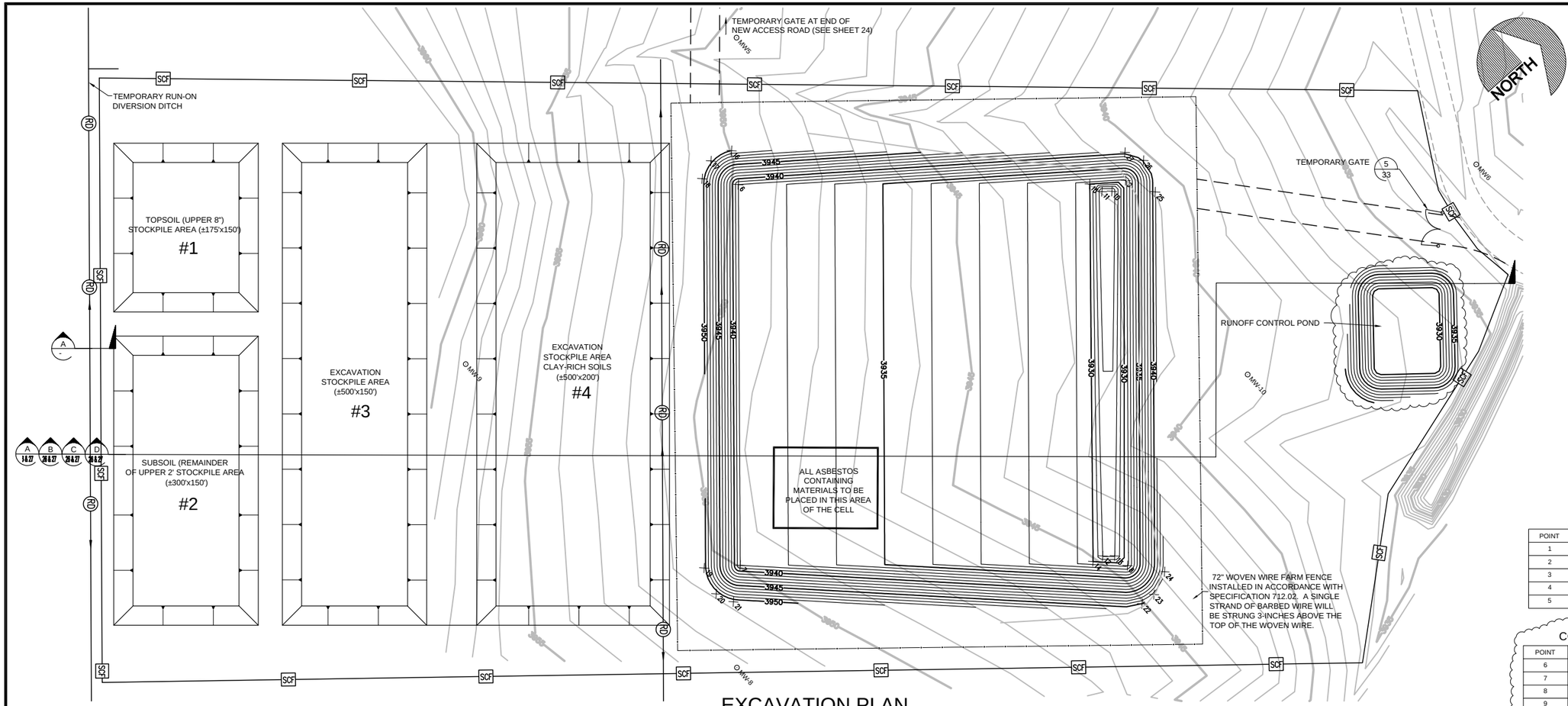
ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
WASTE STOCKPILES AND HAUL ROUTES

DRAWING FILE NUMBER: 900602H005.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER: 24
REV: 2

UPDATE TIME: 2:48PM
SDP\HEL\031209\r\Land Projects\900602\DWG\900602H005.dwg



EXCAVATION PLAN

SCALE: 1"=60'

SCALE
(In Feet)
60 0 60 120 180

LEGEND

- LOCAL ACCESS ROAD
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- GRADE BREAK
- PAVED ACCESS ROAD
- SCF — SEDIMENT CONTROL & SAFETY FENCE
- RD — RUN-ON DIVERSION DITCH
- DRAINAGE FLOW DIRECTION
- MW-10 — MONITORING WELL

NOTES:

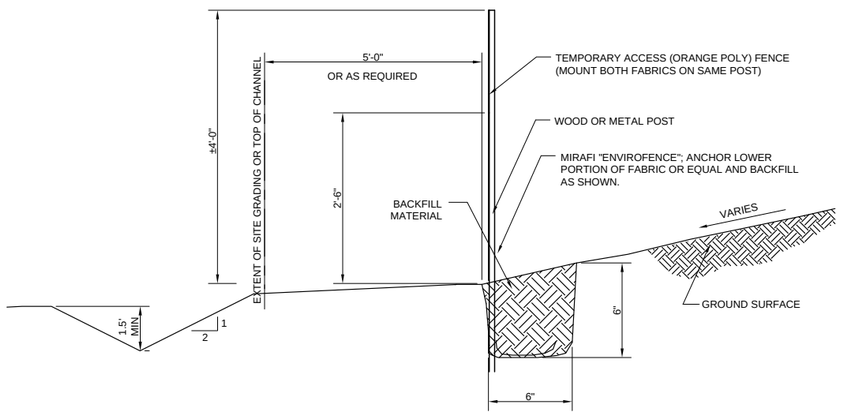
1. PLACE UPPER 8" TOPSOIL FROM EXCAVATION OF CELL INTO STOCKPILE #1.
2. PLACE REMAINDER OF UPPER 2' OF SOIL FROM EXCAVATION OF CELL INTO STOCKPILE #2.
3. PLACE CLAY (FROM SOUTHWEST PORTION OF CELL) EXCAVATION INTO STOCKPILE #4 AS DIRECTED BY ENGINEER.
4. PLACE REMAINDER OF CELL EXCAVATION IN STOCKPILE #3.
5. DO NOT DISTURB EXISTING MONITORING WELLS.
6. PROVIDE TEMPORARY GATES TO CONTROL ACCESS TO SITE.
7. INSTALL ACCESS AND SEDIMENT CONTROL FENCE PRIOR TO START OF EXCAVATION.

CONSTRUCTION PROJECT CONTROL POINTS

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	8812.08	7197.71	3952.51	MW5
2	9296.77	7807.35	3934.54	MW6
3	8376.8943	7685.1041	3954.97	MW-8
4	8376.8165	7262.8426	3961.72	MW-9
5	8974.659	7811.757	3942.6	MW-10

CONSTRUCTION EXCAVATION CONTROL POINTS

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
6	8711.937	7312.5609	3938	EXCAVATION_BOTTOM
7	8450.1242	7608.3295	3938	EXCAVATION_BOTTOM
8	8749.6262	7876.4498	3931	EXCAVATION_BOTTOM
9	9014.4111	7577.298	3931	EXCAVATION_BOTTOM
10	8996.2519	7576.1734	3926	DRAINTRENCH_BOTTOM
11	8988.4434	7569.4587	3926	DRAINTRENCH_BOTTOM
12	8737.0634	7851.8259	3928	DRAINTRENCH_BOTTOM
13	8746.4231	7860.0798	3928	DRAINTRENCH_BOTTOM
14	8725.7628	7849.4088	3930	DRAINTRENCH_TOP
15	8984.017	7555.2358	3930	DRAINTRENCH_TOP
16	8730.1072	7281.649	3949.97	EXCAVATION_TOP
17	8707.0198	7275.3634	3950.51	EXCAVATION_TOP
18	8687.9797	7283.0585	3950.67	EXCAVATION_TOP
19	8420.4098	7585.4651	3950.5	EXCAVATION_TOP
20	8411.8161	7613.8358	3950.9	EXCAVATION_TOP
21	8419.6456	7631.8853	3950.84	EXCAVATION_TOP
22	8734.457	7916.0347	3945.08	EXCAVATION_TOP
23	8750.1013	7917.1424	3944.57	EXCAVATION_TOP
24	8774.0545	7906.7833	3943.78	EXCAVATION_TOP
25	9029.3803	7606.5488	3940.86	EXCAVATION_TOP
26	9042.042	7574.0813	3940.27	EXCAVATION_TOP



SECTION A
SCALE: NTS

ACCESS AND SEDIMENT CONTROL FENCE DETAIL

ITEMS IN THIS PHASE COMPLETED

REVISIONS NO	BY	DATE	DESCRIPTION
2	SDP	11/9/07	MOVED RUNOFF CONTROL POND, REVISED EXCAVATION CONTROL POINTS
1	MWR	2/26/07	REVISED WOVEN WIRE SIZE, SHEET REFERENCE, & DRAINAGE ARROWS

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1
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Project No.: 9006

DRAWN BY	SDP	12/20/06
CHECKED BY	MWR	1/17/07
APPROVED BY	MJO	1/19/07
SCALE:	AS NOTED	

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
EXCAVATION SITE PLAN

DRAWING FILE NUMBER
900602H006.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 25 REV 2

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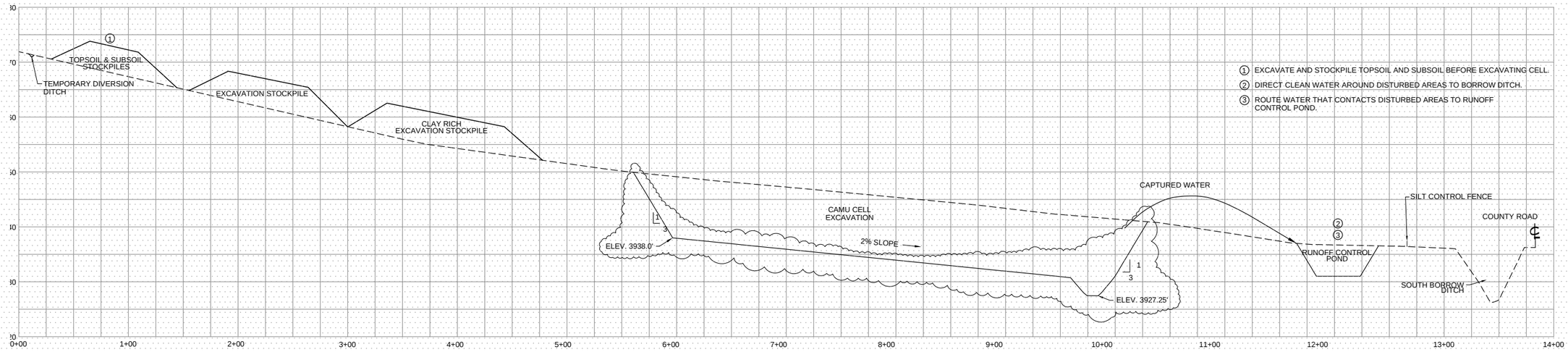
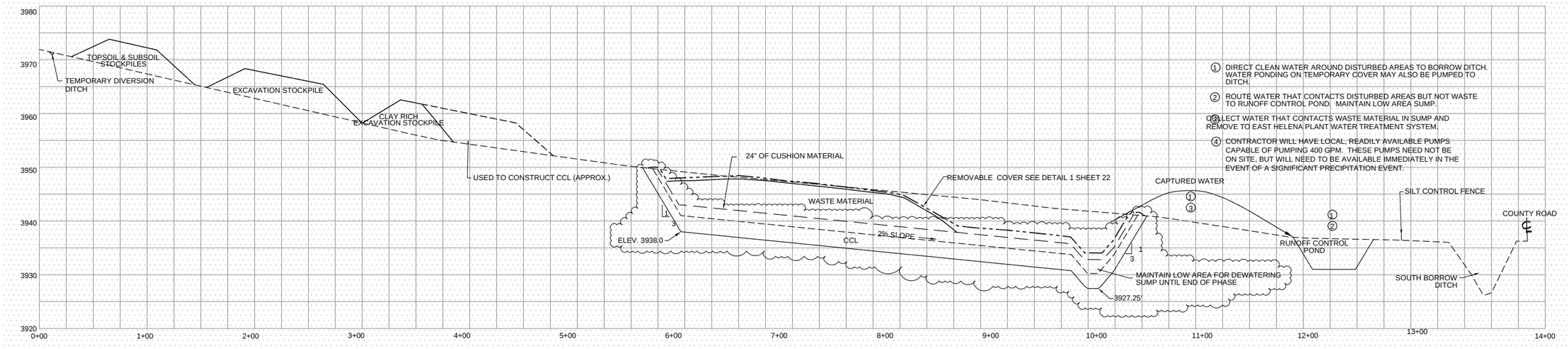


SECTION A – EXCAVATION PHASE

SCALE: (H) 1"=50' (V) 1"=10'



SECTION B – DURING INTERMEDIATE WASTE MATERIAL PLACEMENT PHASE

SCALE: (H) 1"=50' (V) 1"=10'

ITEMS IN THIS PHASE COMPLETED

REVISIONS	NO	BY	DATE	DESCRIPTION
	1		11/12/07	CHANGED BOTTOM ELEVATIONS

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006		
DRAWN BY	SDP	12/03/06
CHECKED BY	MWR	1/17/07
APPROVED BY	MJO	1/19/07
SCALE: AS NOTED		

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
EROSION CONTROL PLAN
WASTE PLACEMENT

DRAWING FILE NUMBER
900602H007.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 26 REV 1

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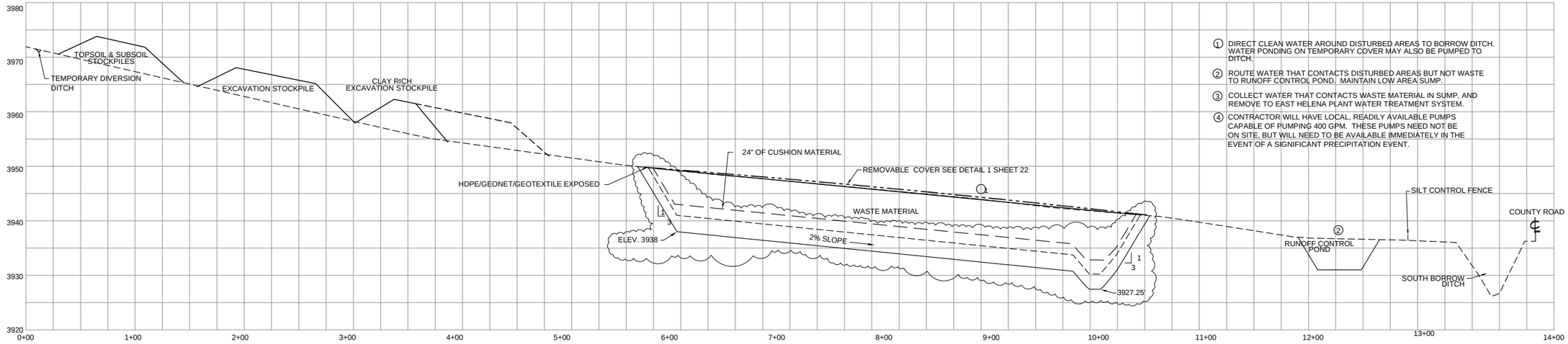
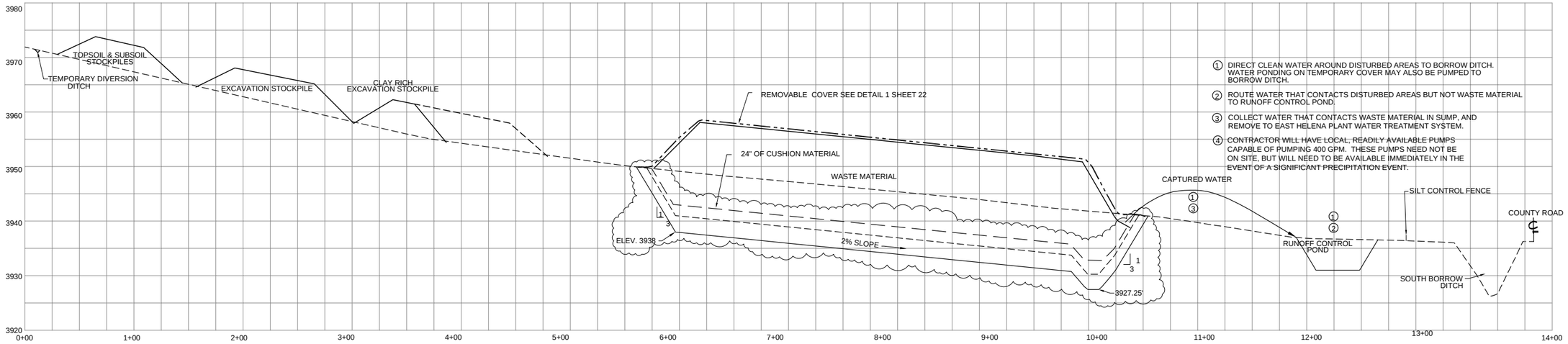


SECTION C–

SCALE: (H) 1"=50' (V) 1"=10'

CLOSURE OF 2007 CONSTRUCTION YEAR WASTE MATERIAL PLACEMENT PHASE



SECTION D–

FINAL WASTE MATERIAL PLACEMENT PHASE

REVISIONS	NO	BY	DATE	DESCRIPTION
	2	SDP	3/11/09	GRAYED PREVIOUSLY COMPLETED TASKS AND HIGHLIGHTED 2009 WORK
	1		11/12/07	CHANGED BOTTOM ELEVATIONS

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006		
DRAWN BY	SDP	1/4/07
CHECKED BY	MWR	1/17/07
APPROVED BY	MJO	1/18/07
SCALE: AS NOTED		

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
EROSION CONTROL PLAN
WASTE PLACEMENT

DRAWING FILE NUMBER
900602H002.dwg
AUTOCAD 2004 DRAWING (DWG)
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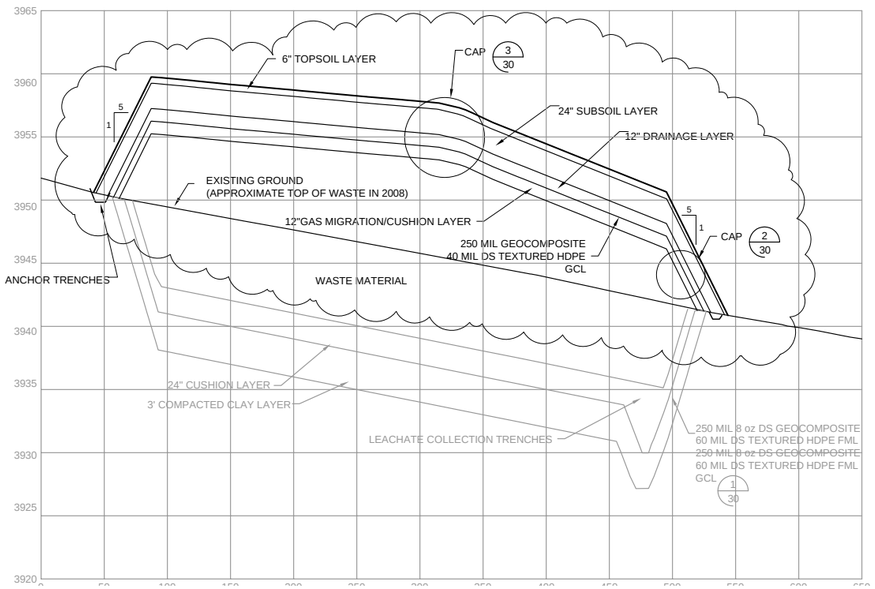

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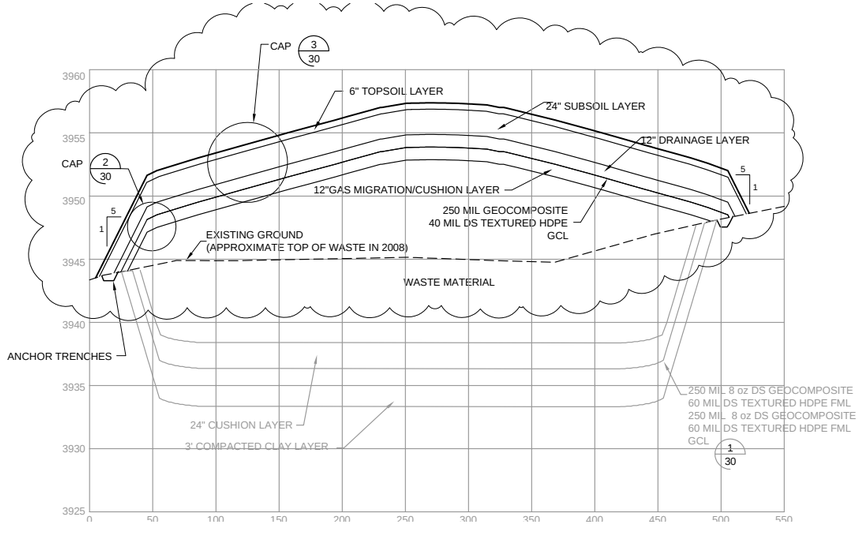
SCALE: (H) 1"=60'
(V) 1"=6'



SECTION B/-
SCALE: (H) 1"=60'
(V) 1"=6'

CAMU PLAN VIEW
SCALE: 1"=50'

COMPLETE ITEMS GRAYED BACK FOR CLARITY

REVISIONS	NO	BY	DATE	DESCRIPTION
	3	GWL	03/10/09	UPDATED FOR 2009 WORK / GRAYED BACK COMPLETE ITEMS/REVISED GRADING PLAN AND SECTIONS
	2	SDP	11/12/07	CHANGED ELEVATIONS OF BOTTOM OF CELL
	1	MWR	4/26/07	REVISED BOTTOM LINER TO SHOW GCL AND TEXTURED HDPE

REVISIONS	NO	BY	DATE

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006		
DRAWN BY	SDP	12/18/06
CHECKED BY	MWR	1/18/07
APPROVED BY	MJO	1/19/07
SCALE: AS NOTED		

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
CROSS SECTIONS

DRAWING FILE NUMBER
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AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 28 REV 3

UPDATE TIME: 4:10PM
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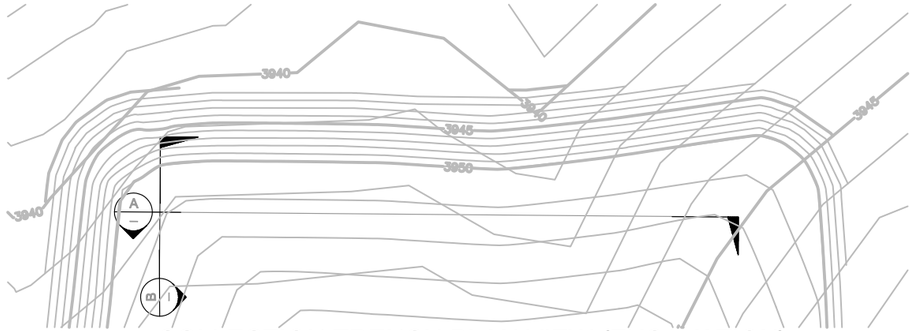


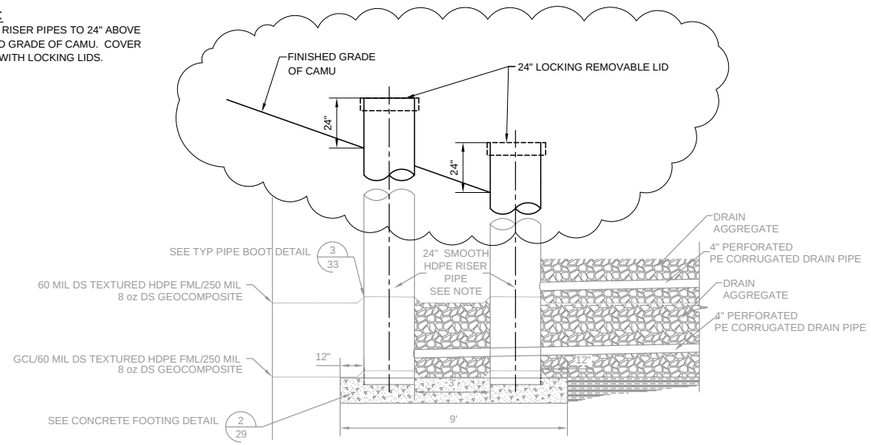
COLLECTION TRENCH PLAN VIEW (EXCAVATION)

SCALE: 1"=50'

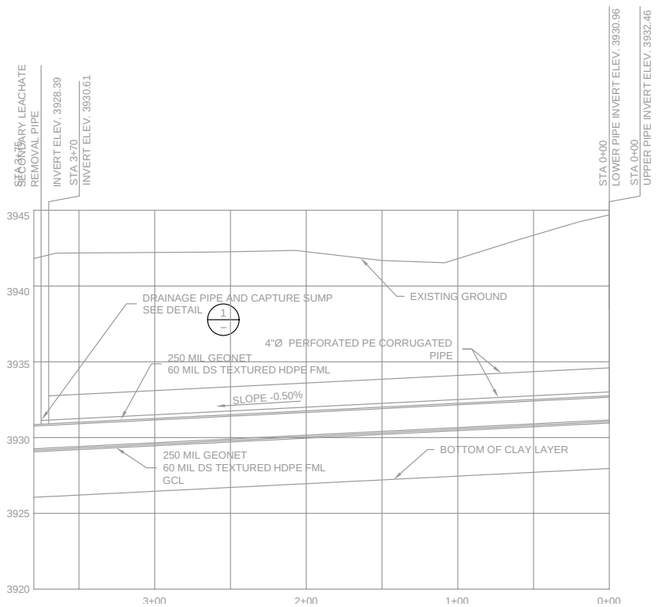
LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- 2008 INDEX CONTOUR
- 2008 INTERMEDIATE CONTOUR
- 2008 PAVED ACCESS ROAD

NOTE:
EXTEND RISER PIPES TO 24" ABOVE FINISHED GRADE OF CAMU. COVER RISERS WITH LOCKING LIDS.

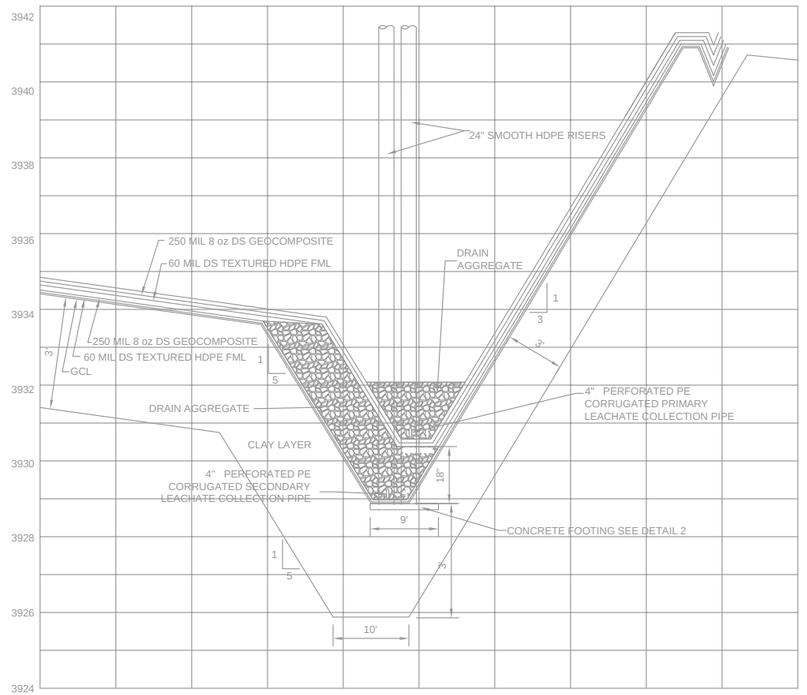


DETAIL 1/– NTS RISER PIPE SUMP



SECTION A/– SCALE: 1"=50' PROFILE OF DRAIN TRENCH

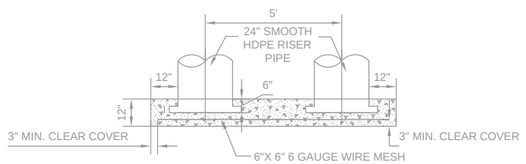
NOTE:
DRAIN AGGREGATE NOT SHOWN FOR CLARITY



SECTION B/– SCALE: (H)1"=10' (V)1"=2' LEACHATE COLLECTION SYSTEM WITH LINERS

NOTES:
1. LINER, GEONET AND GEOTEXTILE NOT SHOWN TO SCALE.
2. COMPACTED CLAY LINER 3.0' MEASURED PERPENDICULAR TO THE SLOPE.

PLAN VIEW



SIDE VIEW

DETAIL 2/– NTS RISER PIPE CONCRETE FOOTING

NOTE:
COMPLETE ITEMS GRAYED BACK FOR CLARITY

REVISIONS	NO	BY	DATE	DESCRIPTION
	3	GWL	03/10/09	UPDATED FOR 2009 WORK / GRAYED BACK COMPLETE ITEMS
			11/12/07	CHANGED ELEVATIONS OF BOTOM OF CELL, STATION EDITS
	1	MWR	4/26/07	REVISED BOTTOM LINER TO SHOW GCL AND TEXTURED HDPE

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006		
DRAWN BY	SDP	12/12/06
CHECKED BY	MWR	1/17/07
APPROVED BY	MJO	1/19/07
SCALE: AS NOTED		

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Consulting Scientists and Engineers
Helena, Montana 59601
3020 Bozeman Avenue
(406) 443-4150

ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
LEACHATE DETECTION, COLLECTION, AND REMOVAL SYSTEM SECTIONS AND DETAILS

DRAWING FILE NUMBER: 900602H004.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER: 29 REV: 3

UPDATE TIME: 3:39PM
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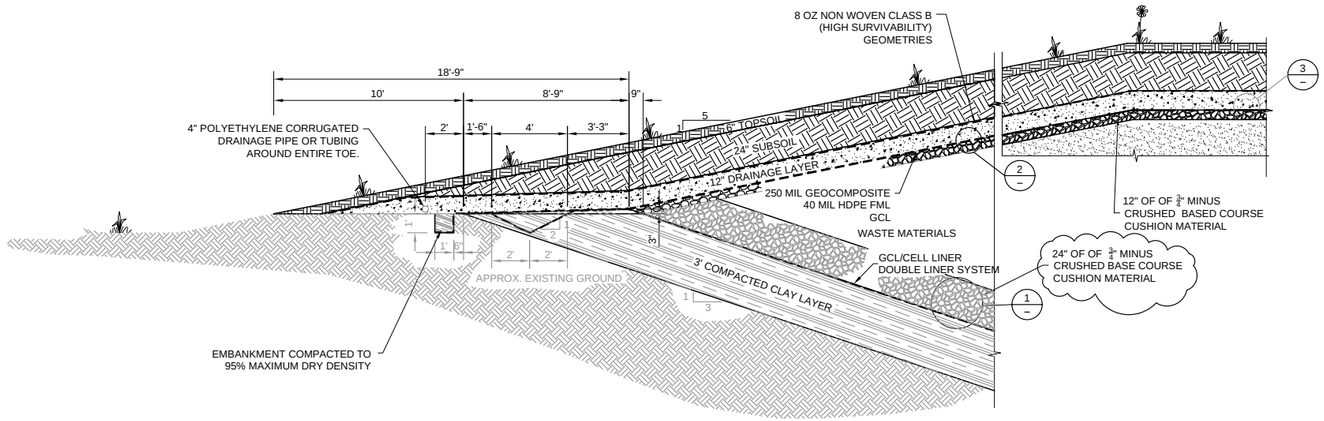
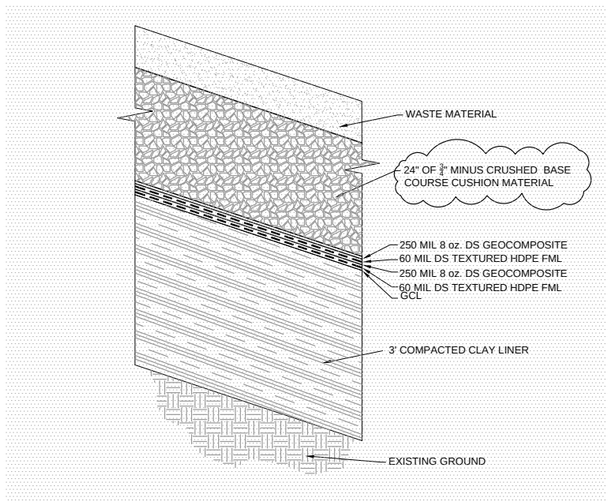
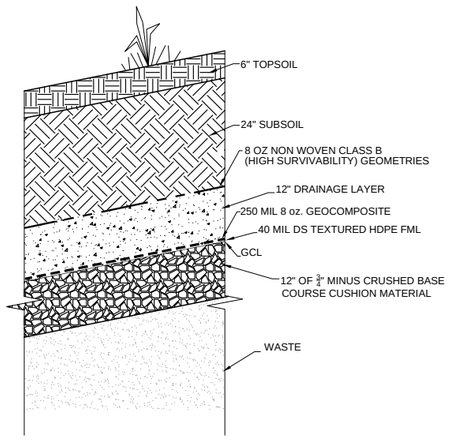


TYPICAL SECTION OF COMPLETED CAMU PHASE 2 CELL

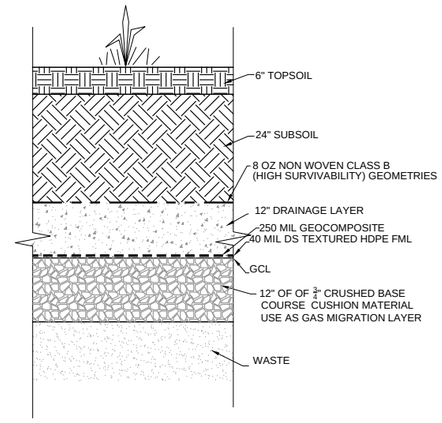
SCALE: 1" =4



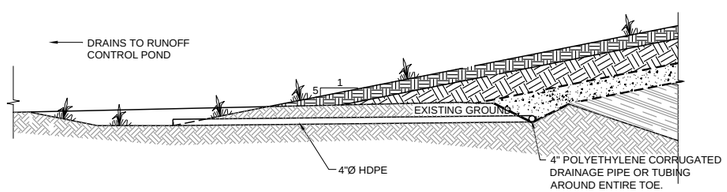
1 DETAIL
TYPICAL BOTTOM LINER
SCALE: NTS



2 DETAIL
TYPICAL CAP CONSTRUCTION ON SLOPES
SCALE: NTS



3 DETAIL
TYPICAL CAP CONSTRUCTION INCLUDING GAS MIGRATION LAYER
SCALE: NTS



SECTION A TOE DRAIN
SCALE: NTS

ITEMS IN THIS PHASE COMPLETED

REVISIONS	NO	BY	DATE	DESCRIPTION
	1	MWR	4/26/07	REVISED BOTTOM LINER TO SHOW GCL AND TEXTURED HDPE
				(CONT.) REVISED CUSHION LAYER THICKNESS AND GRADATION
	2	MWR	4/01/08	REVISED CUSHION LAYER MATERIAL
	3	SDP	3/11/09	GRAYED PREVIOUSLY COMPLETED TASKS AND HIGHLIGHTED 2009 WORK

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Project No.: 9006

DRAWN BY	SDP	12/28/06
CHECKED BY	MWR	1/11/07
APPROVED BY	MJO	1/12/07
SCALE:	AS NOTED	

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
CAP AND BOTTOM LINER DETAILS

DRAWING FILE NUMBER
900602H001.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 30 3
REV

UPDATE TIME: 4:18PM
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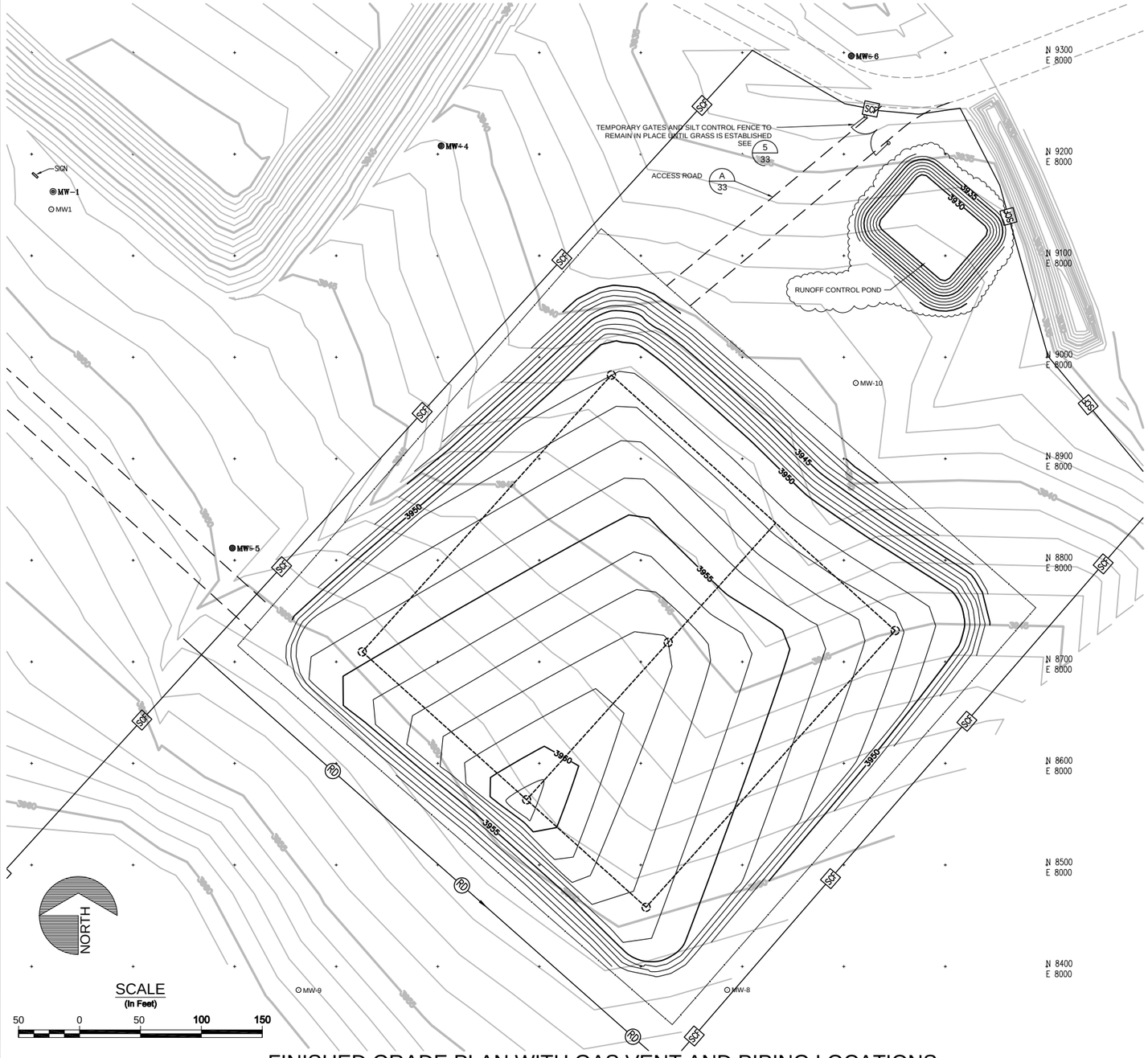
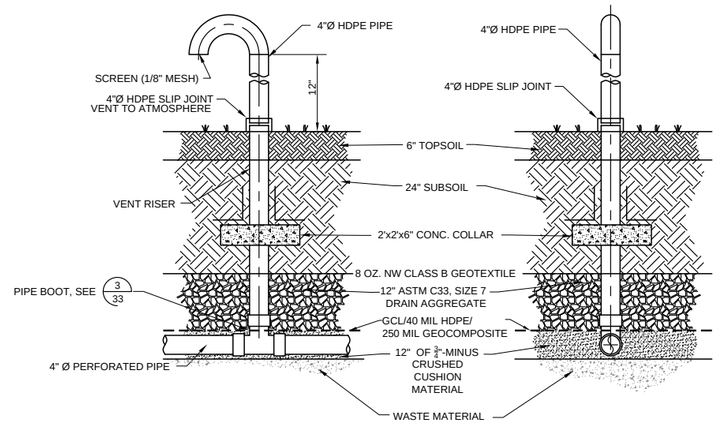


FINISHED GRADE PLAN WITH GAS VENT AND PIPING LOCATIONS

SCALE: 1"=50'



DETAIL 1/- SCALE: NTS VENT PIPE SECTION

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	8812.08	7197.71	3952.51	MW5
2	9296.77	7807.35	3934.54	MW6
3	8376.8943	7685.1041	3954.97	MW-8
4	8376.8165	7262.8426	3961.72	MW-9
5	8974.659	7811.757	3942.6	MW-10

REVISIONS	NO	BY	DATE	DESCRIPTION
	2	SDP	**3/11/09**	REMOVED GRAY HATCH,CHANGED CAP GRADING PLAN
	1	SDP	**11/12/07**	**MOVED RUNOFF CONTROL POND, CHANGED BOTTOM ELEVATIONS**

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 1
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Project No.:	9006	
DRAWN BY	SDP	12/11/06
CHECKED BY	MRW	1/17/07
APPROVED BY	MJO	1/19/07
SCALE:	AS NOTED	

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
FINISHED GRADE PLAN WITH GAS VENT LOCATIONS AND DETAILS

DRAWING FILE NUMBER: 900602H008.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER: 31 REV: 2

UPDATE TIME: 4:36PM
SDP\HEL\031209\I:\Land Projects\900602\DWG\900602H008.dwg

RUNOFF CONTROL POND PLAN VIEW

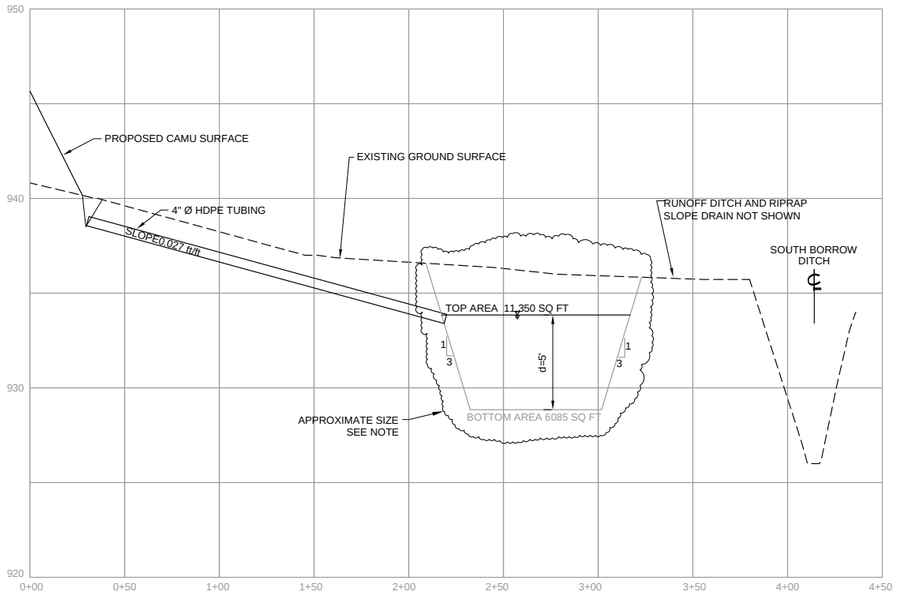
SCALE: 1"=20'

PROJECT QUANTITY TABLE

(ROUGH QUANTITIES FOR BIDDING PURPOSES ONLY)

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	Access Road-North(1510 ft long x 30 ft wide)	5034	SY
2	Access Road-South (383 ft long x 30 ft wide)	1277	SY
3	Excavation & Stockpile - Topsoil (upper 6")	4,100	CY
4	Excavation & Stockpile - Subsoil (next 16")	11,000	CY
5	Excavation & Stockpile - Cell Excavation	68,900	CY
6	Subgrade Preparation, Grade & Compact	25,000	SY
7	Compacted Clay Liner	23,800	CY
8	GCL	49,700	SY
9	HDPE, Double-Sided Textured 60 mil	49,700	SY
10	250 mil 8 oz. DS Drainage Geocomposite	49,700	SY
11	Leachate Collection & Removal Systems- 4" Perf Pipe	757	LF
12	Leachate Collection & Removal Systems-Drain Gravel	500	CY
13	Leachate Collection & Removal Systems-24" Stand Pipes	50	LF
14	Runoff Control Pond	2900	CY
15	Crushed ¾" to 4" Material-Bottom of Cell	7,600	CY
16	Minus 4" Material-Bottom of Cell	7,600	CY
17	Crushed ¾"-Minus Cushion Material-Under Cap	7,900	CY
18	Load, Haul, Place & Compact Waste Materials	39,783	CY
19	Temporary Cover, RPE 25	24,500	SY
20	Load, Haul, Place & Compact Waste Materials-2009	29,132	CY
21	GCL	26,700	SY
22	HDPE, Double Sided Textured 40 mil	26,700	SY
23	250 mil 8 oz. DS Drainage Geocomposite	26,700	SY
24	ASTM C33, Size 7, Coarse Drain Aggregate	8,900	CY
25	8 oz. NW Class B Filter Geotextile	27,790	SY
26	Gas Extraction Piping, 4" Perforated HDPE w/ Risers	1855	LF
27	Cap Drainage Collection, 4" Perforated HDPE	1,800	LF
28	Cap Drainage Culvert, 4" HDPE	185	LF
29	Cover Soil Layer	25,500	CY
30	Permanent Run-on Diversion Ditches	750	LF
31	Seed, Fertilize, & Mulch – Off Plant	13.1	ACRE
32	Woven Wire Farm Fence	2,225	LF
33	Chain Link Fence with Appurtenances	2,225	LF

(GRAYED BACK ITEMS NOT INCLUDED IN THIS PHASE)

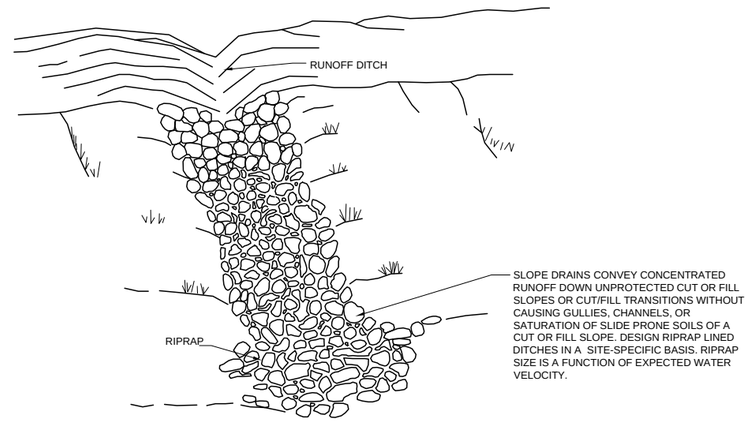


SECTION A – RUNOFF CONTROL POND

SCALE: (H) 1"=40 (V) 1"=4'

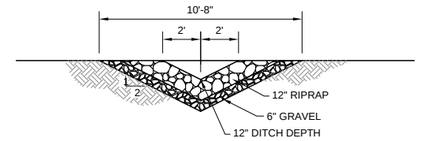
(COMPLETED ITEMS GRAYED BACK FOR CLARITY)

NOTE:
USE EXISTING EXCAVATED AREA FOR RUNOFF CONTROL POND. SHAPE TO AT LEAST THE MINIMUM DIMENSIONS SHOWN IN SECTION A



DETAIL 1 – RIPRAP SLOPE DRAIN

SCALE: NTS



NOTE:
BANK PROTECTION TO BE TYPE 3.
USE CLASS I RIPRAP.

DETAIL 2 – RIPRAP SLOPE DRAIN TYPICAL SECTION

SCALE: NTS

REVISIONS	NO	BY	DATE	DESCRIPTION
	4	SDP	3/11/09	GRAYED COMPLETED TASKS/HIGHLIGHTED 2009 TASKS
	3	MWR	11/14/07	MOVED RUNOFF CONTROL POND, EDIT QUAN TABLE AND SECTION A
	2	MWR	4/26/07	UPDATED QUANTITY TABLE
	1	MWR	2/26/07	REVISED RUNOFF CONTROL POND EXCAVATION QUANTITY
	5	MWR	3/12/09	UPDATED QUANTITY TABLE

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Project No.: 9006		
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SCALE: AS NOTED		

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT

RUNOFF CONTROL POND PLAN AND RIPRAP SLOPE DRAIN DETAILS

DRAWING FILE NUMBER: 900602H009.dwg
AUTOCAD 2004 DRAWING (DWG)

SHEET NUMBER: 32 REV: 4

UPDATE TIME: 4:23PM
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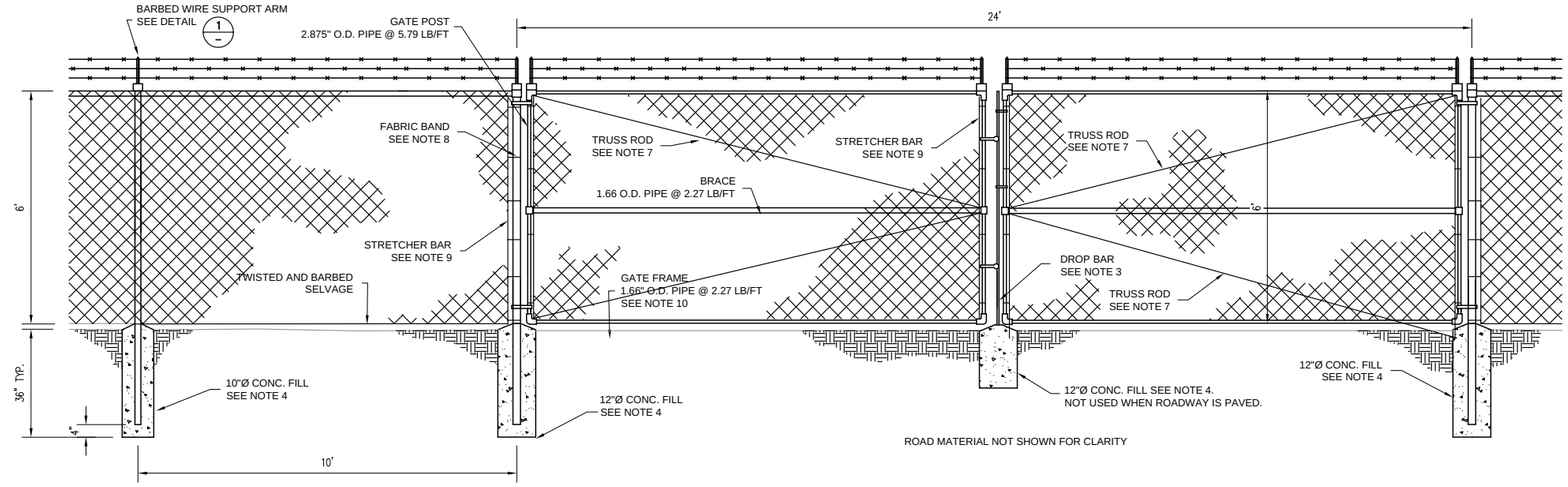


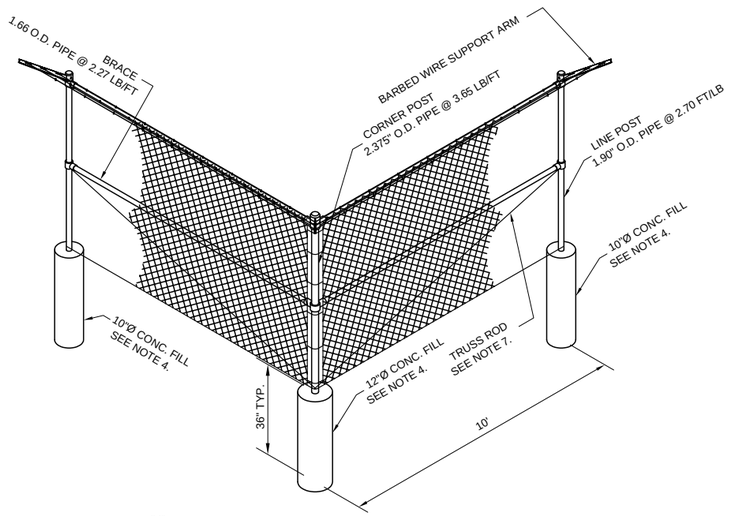
6-FOOT CHAIN LINK FENCE

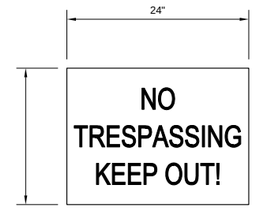
NTS

DETAIL 1/- SCALE: NTS — BARBED WIRE SUPPORT ARM

FENCE NOTES:

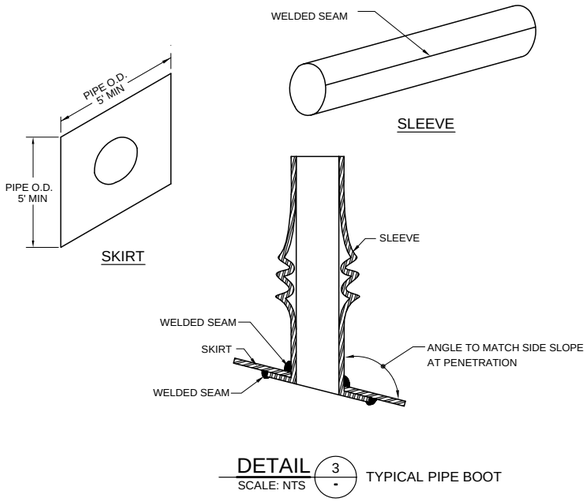
1. DO NOT INSTALL DOUBLE PANELS MORE THAN 300' APART.
2. PULL POST BRACING IS THE SAME AS IN THE CORNER
3. A DROP BAR LOCKING DEVICE IS REQUIRED FOR ALL DOUBLE GATE INSTALLATIONS. THE DROP BAR MUST BE ABLE TO BE INSERTED INTO THE CONCRETE BLOCK AT LEAST 6".
4. ALL CONCRETE IS CLASS "F" OR BETTER.
5. US 2-POINT 12-½ OR 13-½ GAUGE WIRE. PROVIDE THE PROJECT MANAGER CERTIFICATION THAT THE WIRE MEETS ASTM A 121 REQUIREMENTS.
6. FENCE FABRIC MUST HAVE 2" OPENINGS AND MEET AASHTO M 181 REQUIREMENTS. USE 9-GAUGE WIRE FOR FABRIC.
7. FURNISH ⅜" GALVANIZED TRUSS RODS WITH DROP-FORGED TURNBUCKLES OR ⅜" ALUMINUM TRUSS RODS WITH CAST ALUMINUM TURNBUCKLES.
8. STEEL BANDS MUST BE A MINIMUM OF ⅛" THICK BY ¾" WIDE. ALUMINUM BANDSMUST BE A MINIMUM OF ⅛" THICK BY ⅞" WIDE.
9. STEEL OR ALUMINUM STRETCHER BARS MUST BE AT LEAST ¼" THICK BY ¾" WIDE AND AT LEAST 2" SHORTER THAN THE FABRIC WIDTH USED.
10. THE GATE FRAME CORNERS MAY BE WELDED OR FASTENED AND REINFORCED WITH GALVANIZED MALLEABLE-IRON FITTINGS DESIGNED FOR THE USE.



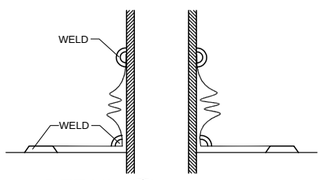


DETAIL 2/- SCALE: NTS — SIGN

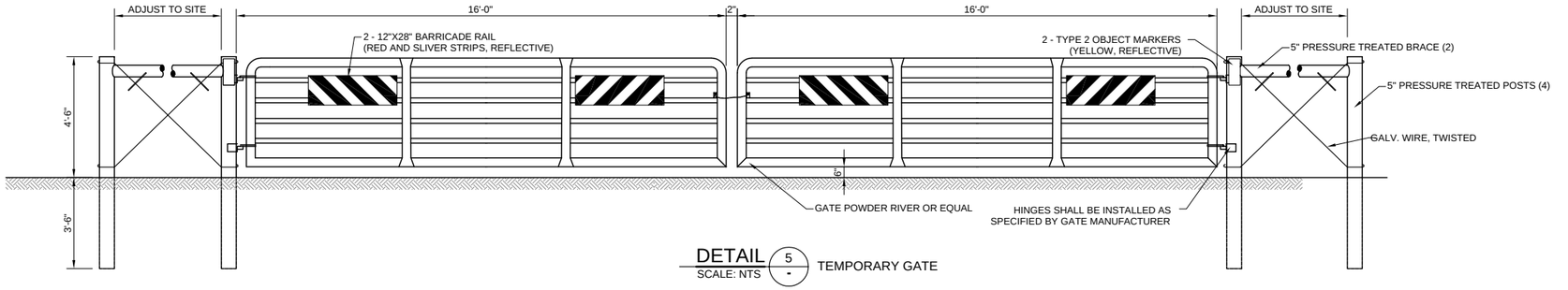
NOTE:
SIGNS TO BE MADE FROM ALUMINUM SHEET AS DESCRIBED IN THE SPECIFICAITONS. LETTERS WILL BE 2" HIGH (MIN.) TYPE A ACRYLIC REFLECTORS. BACKGROUND PAINT WILL BE RED. A BORDER SIMILAR IN COLOR WILL ALSO BE SUPPLIED. SIGNS TO BE PLACED ON EACH GATE AND MIDWAY ALONG THE FENCE ON NON-GATED SIDES.



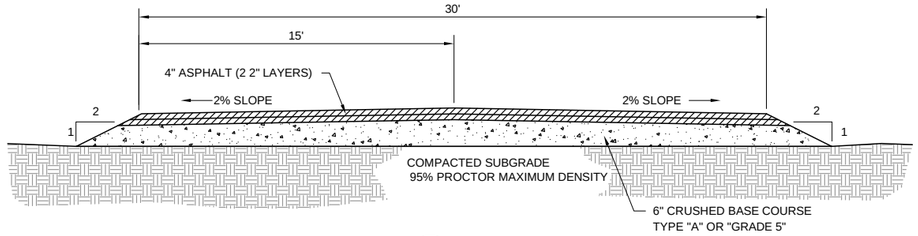
DETAIL 3/- SCALE: NTS — TYPICAL PIPE BOOT



DETAIL 4/- SCALE: NTS — ACCORDIAN PIPE BOOT WELD



DETAIL 5/- SCALE: NTS — TEMPORARY GATE



SECTION A/- TYPICAL PAVED ACCESS ROAD

REVISIONS	NO	BY	DATE	DESCRIPTION

REVISIONS	NO	BY	DATE

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
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Project No.: 9006		
DRAWN BY	SDP	11/25/06
CHECKED BY	MWR	1/18/07
APPROVED BY	MJO	1/19/07
SCALE: AS NOTED		

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ASARCO LLC - EAST HELENA PLANT
CAMU PHASE 2 CELL PROJECT
MISCELLANEOUS DETAILS

DRAWING FILE NUMBER
900602H010.dwg
AUTOCAD 2004 DRAWING (DWG)
SHEET NUMBER 33
REV △

UPDATE TIME: 5:02PM
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APPENDIX C

PROJECT SPECIFICATIONS

The Standard Specifications for Road and Bridge Construction, edition of 1995, prepared by the Montana Department of Transportation and Montana Transportation Commission, hereinafter referred to as the "Standard Specifications," shall be applied to Project work as specified below and shall govern this Project and form the basis of this Contract, except as modified in these Contract Documents. Contractor shall note the 1995 Standard Specifications shall be used as modified herein without subsequent amendments or newer publications made by the Montana Department of Transportation and Montana Transportation Commission. The Standard Specifications are modified herein as detailed in the following divisions. Division and subdivision numbers refer to corresponding numbers of the Standard Specifications. Additional division or sections numbers may be used to specify items of work not included in the Standard Specifications.

Copies of the 1995 Standard Specifications may be obtained from Montana Department of Transportation, Contract Plans Section, 2701 Prospect Avenue, P.O. Box 201001, Helena, Montana 59620-1001, Telephone (406) 444-6215.

DIVISION 200 - EARTHWORK
DIVISION 600 - MISCELLANEOUS CONSTRUCTION
DIVISION 700 - MATERIALS

DIVISION 200 – EARTHWORK

SECTION 203 - EXCAVATION AND EMBANKMENT:

Add the following subsections to this section.

203.06 DESCRIPTION OF CAMU PROJECT EARTHWORK

This specification covers the requirements for labor, supervision, equipment and materials associated with the earthwork operations shown on or implied by the design Drawings, or herein specified. Earthwork activities shall include, but not be limited to project layout, soil testing, site drainage, dust control, clearing, disposal, excavation, subgrade preparation, protection and removal of known underground utilities, fill and backfill, embankments, finish grading and site restoration.

203.07 CONSTRUCTION REQUIREMENTS OF CAMU PROJECT EARTHWORK

203.07.1 Grade Control and Layout of Work

The Contractor shall furnish all stakes, markers, tools, equipment and labor required to lay out the work from bench marks and/or control point markers indicated on the drawings. The Contractor shall not disturb existing survey monuments or bench marks without the consent of the Engineer. Markers that are accidentally disturbed by earthwork operations shall be replaced at the Contractor's expense by a licensed land surveyor. Copies of all survey notes will be given to the Engineer within one day after survey is conducted. Restaking and remarking of layout stakes caused by misinterpretation of the specifications will be at the Contractor's expense. It is recommended that the surveyor meet with the Engineer to review grades and dimensions, prior to commencing layout surveys. During construction of the compacted clay liner, the Contractor must provide a system for tracking stakes used for layout to ensure that none are lost within the compacted clay layer.

203.07.2 Inspection and Testing

The Owner may employ independent engineering firms for Quality Assurance inspection and testing. Contractor shall cooperate with the Owner's oversight personnel. The Owner will pay for Quality Assurance testing. However, if initial testing indicates that the Contractor has not complied with the Contract Documents, then the costs of subsequent testing associated with the non-compliance will be deducted from the Contract price. Quality Assurance testing will include but not be limited to the tests listed in Tables 4-1, 4-2, and 4-3.

The Contractor is required to conduct Quality Control testing. Costs for these tests will paid by the Contractor.

TABLE 4-1. STOCKPILE ACCEPTANCE TESTING

Parameter	Test Method	Frequency	Test Standard	Rejection Criteria
Soil Type and Quality	Visual	Continuous	Maximum particle size <1 inch	Reject any excavated material that has not been screened to 1 inch minus
Liquid and Plastic Limits	ASTM D-4318	1 per 1,000 cy	PI>8	Reject portions of the stockpile not meeting the standard or conduct additional hydraulic conductivity tests with failing soils
Remolded Hydraulic Conductivity	ASTM D-5084	1 per 3,500 cy or minimum of 6 tests	Hydraulic conductivity must not exceed $1x10^{-6}$cm/sec	Reject portions of the stockpile not meeting standard.

TABLE 4-2. QC TESTING FOR CCL PLACEMENT

Parameter	Test Method	Frequency	Test Standard	Rejection Criteria
Soil Type and Quality	Visual	Continuous	Maximum particle size <1 inch	Reject all material that has not been screened to 1 inch minus
Scarification	Visual/Tape Measure	100%	Surface scarified to a depth of 0.5-2.0 inches and a spacing of 6-12 inches before accepting additional lifts	Recompact and/or scarify any surface not meeting standard
In-Place Density	ASTM D-2922	5 per acre per lift	95% of maximum dry density Less than 3% of all densities may not meet the standard above. Of those not meeting standard, no dry density less than 5 pcf less than 95% of maximum dry density. Sample locations shall be selected by the Engineering Inspector based on grid pattern established at project outset.	Reject and reprocess those areas with dry density less than 5 pcf less than 95% of maximum dry density or if cumulative failures exceed 3% of all tests
In-Place Water Content	ASTM D-3017	5 per acre per lift	Less than 3% of all measured water content may have water content wetter than +2% or dryer than –3% of optimum	Reject or reprocess material that exceeds both +2%/-3% criteria
Construction Stakes for Grade Control	Daily Inventory	Daily	Contractor must return all construction stakes used for grade control at the end of each shift to the Engineering Inspector	Reject and replace day's work if stake or portion of stake used near CCL boundary is missing
Proctor Moisture Density Curve	ASTM D-698 or AASHTO T-99	1 per 2,500 cy	N/A	N/A
Compactive Effort	Visual	Continuous	Contractor to establish rolling pattern and equipment that produces necessary compaction	Rework all areas not sufficiently compacted
Lift Thickness	Visual/Tape Measure	5 per acre per lift	No loose lift thickness shall exceed 6 inches. Smaller lifts may be necessary to meet compaction requirements	Remove excess lift thickness.
Hole Repair	Visual	100%	Firmly packed	Reject and replace holes not repaired or incompletely repaired.

TABLE 4-3. QA TESTING FOR CCL PLACEMENT

Parameter	Test Method	Frequency[1]	Test Standard	Rejection Criteria
Soil Type and Quality	Visual	Continuous	Soil must be fine-grained (all particles <1 inch), clay-like and free of debris	Reject all material that does not meet standard
Scarification	Visual/Measuring Tape	100%	Surface scarified to a depth of 0.5-2.0 inches and at a spacing of 6-12 inches	Reject and recompact and/or scarify any surface not meeting standard
Proctor Moisture Density Curve	ASTM D-698 or AASHTO T-99	1 per 2,500[2] cy	N/A	N/A
In-Place Density	Electrical Gauge	1 per acre per lift[2]	95% of maximum dry density Less than 3% of all densities may not meet the standard above. Of those not meeting standard, no dry density less than 5 pcf, less than 95% of maximum dry density	Reject and reprocess those areas with dry density less than 5 pcf less than 95% of maximum dry density or if cumulative failures exceed 3% of all tests
In-Place Water Content	Electrical Gauge	1 per acre per lift[2]	Less than 3% of all measured water content may have water content wetter than +2% or dryer than –3% of optimum	Reject or reprocess material that exceeds both +2%/-3% criteria
In-Place Density	ASTM D-1556	1 per every 10 tests above	N/A	Use to corroborate electrical gauge testing
In-Place Water Content	ASTM D-2216	1 per every 10 tests above	N/A	Use to corroborate electrical gauge testing
Hole Repair	Visual	1 per every five QC tests of same	Firmly packed	Reject and replace holes not repaired or incompletely repaired

Notes:

(1) Frequency noted is a minimum. Inspectors may perform additional tests if conditions change.

(2) Minimum of one test required.

203.07.3 Protection and Safety

Open Excavations. Provide barricades and/or other safety equipment as required to protect any equipment, vehicles and workers from any open excavation.

A. Protection of Property. The Contractor shall protect adjacent property and avoid damage to such property. Adjacent property damaged due to the Contractor's operations shall be repaired or replaced. The repairs and/or replacement shall be equal to existing improvements and shall match existing finish and dimensions.

B. Utilities. The Contractor is responsible for obtaining off-site utility locations as required by law. He will notify the Engineer prior to digging adjacent to utilities.

203.07.4 Subgrade and Fill Protection

During construction, fills and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times.

Finished subgrade shall not be disturbed by traffic or other operations and shall be protected and maintained by the Contractor until completion and acceptance of the work. The storage or stockpiling of materials on the finished subgrade will not be permitted.

203.07.5 Site Drainage

Excavation, fill and backfill work areas shall be continually and effectively drained. Water shall not be permitted to accumulate in excavations or foundation areas. The Contractor shall construct suitable dikes, drains or provide pumping equipment, as required, to divert water flows away from the work areas.

203.07.6 Dust Control and Haul Road Maintenance

Control all dust produced from the project site. Prevent the spread of dust and avoid creation of a nuisance in the surrounding area. The Contractor shall prepare and submit a Dust Control Plan to the Owner for approval before construction begins. The Dust Control Plan will address methods to be used to minimize dust during sodding, hauling waste placement, grading and earthwork operations. It will also describe haul road sweeping and maintenance operations. Control all dust produced from the project site consistent with Appendix E, the Operating Plan, which includes paving of haul roads and operation of street sweepers.

203.07.7 Excavation

A. General Requirements. The Contractor shall excavate every type of material encountered within the limits of the project, to the lines, grades and elevations indicated and as specified herein. Test pit and boring logs for the CAMU site are available from the Engineer.

B. Excavations For Cell Construction

1. The excavation shall be carried down to the elevations shown on the design Drawings. If suitable material in the bottom of the excavation is removed for the Contractor's convenience, the subgrade shall be restored by the Contractor and at his expense, to a condition at least equal to the undisturbed foundation as determined by the Engineer.

2. The Contractor shall remove any surface layer of unsuitable material at the planned grade of the excavation, as determined by the Engineer, from the site.

C. Excavations for Ditches and Drainage Structures. Excavations for ditches and drainage structures shall be accomplished by cutting accurately the line, grade and cross-section required. Trenches and pits shall be of sufficient size to accommodate the installation of piping and structures. Excessive open ditch excavation shall be backfilled with satisfactory materials to the grades shown on the design Drawings. The Contractor shall maintain all excavations free from detrimental quantities of brush, sticks, trash and other debris.

D. Soil Salvage

1. The Contractor shall stockpile the top 8 inches of excavated soil for use as topsoil in the landfill cap.

2. The Contractor shall stockpile the next 16 inches of soil for use as subsoil in the landfill cap.

3. The remainder of excavated clayey sand clay, and silt (sandy loam) material from the landfill cell excavation shall be stockpiled for use in construction of the compacted clay liner. Clay rich soils will be segregated and stockpiled separately from sandier soils. The Engineer will determine material types. Determination limits to be concurred by Contractor.

4. Stockpiles shall be covered or provided with runoff containment in accordance with best management practices for preventing storm water pollution.

E. Subgrade Preparations

1. **General Requirements.** Subgrade shall be shaped to the line, grade and cross-section and compacted as specified for all required embankments and in the CAMU cell. This operation shall include plowing, disking and any moistening or aeration required to obtain proper compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory material as directed by the Engineer.

Low areas resulting from the removal of unsatisfactory material shall be brought up to the required grade with satisfactory materials, and the entire subgrade shall be shaped to the line, grade and cross-section and compacted as specified.

After rolling, the elevation of the finished subgrade shall not vary more than 0.2 foot from the established grade and approved cross-section.

2. **Compaction.** Compaction shall be accomplished by sheepsfoot rollers to at least 90 percent of Proctor maximum dry density.

203.07.8 Embankment

A. Materials

1. **Compacted Clay Liner.** The compacted clay liner shall consist of clay-rich sandy loam material from excavation required for the landfill cell. Cobbles and rock fragments having maximum dimensions of more than 1-inch shall be screened from clay soil used in these liners. Should cobbles and rock fragments of such size be found in otherwise approved earth fill materials, they shall be removed by the Contractor before the materials in the earth fill are rolled and compacted. No brush, roots, sod, or other perishable or unsuitable materials shall be placed in the clay liner or earth cap. Clay-rich soils will be used for the compacted clay liner. Soils with less clay content will be used for the cover soil.

2. **Cushion Material.** The cushion material shall be 24" perpendicular to the liner systems along the bottom and sides of the cell. The cushion layer shall consist of imported 3/4" minus crushed base course meeting the gradation range shown in Table 3. This 24" cushion layer will be maintained over the side walls and bottom of the cell at all times.

3. **Waste Material.** The CAMU Phase 2 cell backfill materials shall consist of materials from source area excavations and demolition debris. Bulk concrete and metal debris will be broken or otherwise reduced in size not to exceed a vertical dimension of 2 feet in diameter. There are no horizontal or width dimension restrictions other than the debris must fit in a haul truck to be transported to the CAMU Phase 2 cell. All material requiring size reduction will be resized at the structure demolition site using excavators with concrete breakers or shears before being transported to the CAMU Phase 2 Cell. Large long material (e.g. timbers, pipe, steel beams, etc.) and manufactured metal will be placed horizontally in the cell as flat as possible to minimize voids. ACM debris will not be sized but will be properly containerized and placed in the Southwest corner of the CAMU Phase 2 Cell as designated on the design drawings.

   All haul roads, turnouts, staging, and dump areas must be constructed 36 inches over the geosynthetics. Tight radius turns will not be made with track-mounted equipment. Asarco must examine the underlying geosynthetics for damage at all locations of spinning tracks or tires and make necessary repairs. Waste placement

should begin at the edge of the landfill and should precede outward building a pad onto which dumping will occur. Low pressure equipment should push the waste onto the cushion layer until the first lift is completed.

4. **Leachate Collection Trench Drain Materials**. The leachate collection trench drainage material shall consist of well graded sand and gravel that is subrounded to round, screened and washed free of vegetable matter, clays, and other deleterious substances that could in time change the hydraulic conductivity of the drainage layer. The gradation of the drainage layer material shall lie within the range shown in Table 4.

5. **Topsoil and Subsoil**. The Contractor shall obtain topsoil and subsoil from soil salvage stockpiles, as described in section 203.07.7 (D)(1) and 203.07.7 (D)(2). Topsoil shall be free of trash, rocks, hard lumps of soil, and stubble. Subsoil shall be free of sharp or jagged rocks, roots, and debris.

TABLE 3. ¾" MINUS CRUSHED BASE COURSE CUSHION LAYER MATERIAL

Sieve Size	Percent Passing
3/4"	100
#4	40 – 80
#10	25 – 60
#200	0 – 5

TABLE 4. LEACHATE COLLECTION TRENCH DRAINAGE MATERIAL (ASTM C33, SIZE 7, COARSE AGGREGATE)

Sieve Size	Percent Passing
3/4"	100
1/2"	89 – 100
3/8"	40 – 70
#4	0 – 15
#8	0 - 5

B. Placement

1. **Compacted Clay Liner.** Compacted clay liner shall be shaped to the line, grade and cross-section and compacted as specified. This operation shall include placement of suitable clay material in lifts not to exceed 6 inches after compaction, disking and any moistening or aeration required to obtain proper compaction. Particles exceeding 1 inch in diameter shall be screened from material to be used in the CCL. Any other

unsatisfactory material shall be removed and replaced with satisfactory material as directed by the Engineer.

Following compaction of any lift or portion of a lift, the fill shall be kept moist. If, in the opinion of the engineer, the prepared surface of any layer of earth fill is too dry or smooth to bond properly with the layer of material to be placed thereon, it shall be moistened and/or worked with harrow, scarifier, or other suitable equipment, in an approved manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer of earth fill material is placed.

The compacted surface of each lift shall be scarified prior to placement of additional lifts. Scarification shall consist of roughening of the entire surface of the lift and, at a minimum, the roughening shall consist of parallel furrows nominally one inch in depth (ranging from 0.5 to 2.0 inches) and spaced no further than 12 inches apart. If scarification is to be done with a disc harrow, the disc gangs shall be turned perpendicular to the line of travel (if possible) and individual disks should be as straight as possible (instead of cupped). This will provide scarification while minimizing the mixing action produced by a disc. The scarification depth shall be considered as part of the maximum depth of the lift to be placed.

If, in the opinion of the Engineer, the compacted surface of any layer of the earth fill in place is too wet for proper compaction of the layer of earth fill material to be placed thereon, it shall be removed; allowed to dry; or be worked with harrow, scarifier, or other suitable equipment to reduce the moisture content to the required amount; and then it shall be recompacted before the next succeeding layer of earth fill material is placed.

2. **Waste Material.** The contractor shall provide a temporary 25-mil RPE OR Liner for the waste material placed in the landfill cell. Special care must be taken to ensure that the waste is covered prior to significant occurrences of precipitation. In addition, the Contractor shall ensure that the waste is placed in a manner that will ensure that the water which falls on the temporary liner will drain to a sump without coming in contact with the waste material and without significant ponding of the water on the temporary liner. The water reaching the sump shall immediately be discharged to the storm water retention pond shown on the Drawings. Therefore, the storm water retention pond shall be constructed prior to placing waste material into the landfill cell. Any storm water coming in contact with the waste material shall not be discharged but shall be removed by the Contractor to the Plant water treatment system.

3. **Cushion Layer.** The contractor shall place the cushion layer material in lifts not less than 12 inches using low ground pressure equipment under guidance of the Engineer to ensure the underlying flexible membrane liner is not damaged. Do not operate any equipment directly on the underlying liners. The material may be slightly wetted to aid in adhesion to the side slopes. All roadways, turnouts, staging areas, and dump

areas used for cushion layer installation must be a minimum of 36 inches thick over the geosynthetics.

4. **Leachate Collection Trench Drain Material.** The Contractor shall place the drain material in a single layer, taking care to protect the underlying flexible membrane layer.

C. Compaction

1. **Compacted Clay Liner.** Except for final preparation of the clay liner to receive the flexible membranes, compaction shall be accomplished by sheepsfoot rollers. The sheepsfoot roller shall have compaction feet of sufficient length to fully penetrate the lift thickness being placed. A smooth drum roller shall be used to provide a smooth top surface of the clay liner once it is ready to receive the flexible membrane liner. The bottom clay liner in the landfill cell shall be compacted to 95 percent of Proctor maximum dry density. Compact the top 6 inches of the subgrade to 90 percent Proctor maximum dry density prior to placement of the compacted clay liner.

    a. **Moisture Control.** The standard optimum moisture content is defined as, "That moisture content which will result in a maximum dry unit weight of the soil when subjected to the ASTM D-698-70, Method A., Proctor Compaction Test." the maximum dry weight, in pounds per cubic foot, obtained by the above procedure is the Proctor maximum dry density.

    The moisture content of the clay liner material prior to and during compaction shall be distributed uniformly throughout each layer of the material. The allowable ranges of placement moisture content are based on design considerations. The moisture control shall be such that the moisture content of compacted earth fill, as determined by tests performed by the Engineer, shall be within the following limits:

    Material represented by the samples tested having a placement moisture content more than 2 percent dry of the standard optimum condition, or more than 3 percent wet of the standard optimum condition will be rejected and shall be removed or reworked until the moisture content is between these limits.

Within the above limits, and based on a continuous record of tests made by the Engineer on previously placed and accepted material, the uniformity of placement moisture content shall be such that:

No more than 3 percent of the samples of accepted liner material will be drier than 2 percent dry of the standard optimum moisture content, and no more than 3 percent will be wetter than 3 percent wet of the standard optimum moisture content.

The average moisture content of all accepted embankment material shall be between 0 and 3 percent wet of the standard optimum moisture content.

The Engineer will inform the Contractor when the placement moisture content is near or exceeds the limits of uniformity specified above, and the Contractor shall immediately make adjustments in procedures as necessary to maintain the moisture content within the specified limits.

b. **Density Control.** Density control of compacted earth fill shall be such that the dry density of the compacted material, as determined by tests performed by the Engineer shall conform to the following limits:

    1) **Compacted Clay Liner.** Material represented by samples having a dry density less than 90 percent of its Proctor maximum dry density will be rejected. Such rejected material shall be rolled until a dry density equal to or greater than 95 percent of its Proctor maximum dry density is obtained.

    Within the above limit and based on a continuous record of tests made by the Engineer on previously placed and accepted embankment, the uniformity of dry density shall such that:

    No more than 3 percent of the material represented by the samples tested shall be at dry density less than 95 percent of Proctor maximum dry density.

    The average dry density of all accepted embankment material shall be not less than 95 percent of the average Proctor maximum dry density.

c. Hole Repair. The placement of survey stakes (if used) as well as the performance of density tests, and hydraulic conductivity tests may require the penetration of lifts of the CCL. The contractor shall repair these penetrations by placing two-inch thick lifts of CCL material into the penetration and thoroughly tamping the lift by hand until the penetration has been filled. The tamping bar or item shall be roughly the same size and shape as the penetration.

2. **Cushion Layer.** The Contractor shall not compact the cushion layer

3. **Gas Migration Layer.** The Contractor shall not compact the gas migration layer but shall lightly roll the layer using nonvibratory compaction equipment with a static weight of 1.5 tons or less to ensure its stability under equipment traffic.

4. **Subsoil.** The Contractor shall lightly roll the subsoil using nonvibratory compaction equipment with a static weight of 1.5 tons or less to ensure its stability under equipment traffic.

5. **Waste Materials.** The Contractor shall compact waste soils with a minimum of eight (8) passes (4 cycles) of a padfoot roller. Place the waste soils in a maximum lift thickness of 2 feet.

   All haul roads, turnouts, staging, and dump areas must be constructed 36 inches over the geosynthetics. Tight radius turns will not be made with track-mounted equipment. Asarco must examine the underlying geosynthetics for damage at all locations of spinning tracks or tires and make necessary repairs.

   Waste placement should begin at the edge of the landfill and should precede outward building a pad onto which dumping will occur. Low pressure equipment should push the waste onto the cushion layer until the first lift is completed.

   The initial life of waste must be free of debris that may damage the geosynthetics. This material would include, but is not limited to, large sharp pieces of metal, rebar, pointed wood timber, stakes, and piping. The Engineer and third-party independent oversight representative must be satisfied that the initial lift of waste will not have any detrimental effect on the liner.

   The Contractor may choose the equipment and manner with which to place the initial lift of waste material in the cell. However, it must be satisfactorily demonstrated to the Engineer and third-party independent oversight representative that both the equipment and manner used to place and compact the waste material over the liner will not have any detrimental effect on the liner.

D. Finish Grading

The surface of all excavation, fill, embankment and subgrade shall be finished to a reasonable smooth and compact surface in accordance with the lines, grades and cross-sections shown. The degree of finish for all graded areas shall be within 0.2 foot of the grades and elevations indicated. Gutters and ditches shall be finished in manner that will result in effective drainage.

END OF SECTION

DIVISION 600

MISCELLANEOUS CONSTRUCTION

SECTION 622 GEOSYNTHETICS CONSTRUCTION

622.01 MATERIALS

Replace with the following paragraph.

Furnish materials meeting the following requirements:

Geotextiles	Subsection 713.13
Geomembranes	Section 623
Geocomposite	Section 624
GCL	Section 625

SECTION 623 FLEXIBLE MEMBRANE LINER (FML)

Add the following new section.

623.01 DESCRIPTION

A. Scope. The work covered by these Specifications consists of furnishing and installing high-density polyethylene (HDPE) and reinforced polyethylene (RPE) flexible membrane liners where shown on the Drawings.

B. Definitions used in this section.

1. **Air Lance**. Consists of a stream of air forced through a 3/32" air nozzle at the end of a hollow metal tube for conducting a commonly used nondestructive test method to determine seam continuity and tightness of relatively thin, flexible geomembrane.

2. **Bodied Chemical Fusion Agent**. A chemical fluid containing a portion of the parent geomembrane that, after application of pressure and after the passage of time, results in the chemical fusion of two essentially similar geomembrane sheets, leaving behind only that portion of the parent material.

3. **Geomembrane**. An essentially impermeable synthetic membrane used as a solid or liquid barrier. Synonymous term for flexible membrane liner (FML).

4. **Seaming Boards**. Smooth wooden boards, conveyor belt, or similar hard surface (preferably 1" X 12" X 8', or more), placed beneath the area to be seamed to provide a uniform surface to apply roller pressure in the fabrication of field seams.

5. **Tensiometer**. A device containing a set of opposing grips used to place a geomembrane seam in tension for evaluating its strength in shear or in peel.

6. **Vacuum Box Assembly**. Consists of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole, or valve assembly, and a vacuum gauge for conducting a nondestructive test method which develops a vacuum in a localized region of a geomembrane seam in order to evaluate the seam's tightness and suitability.

623.02 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications

1. The installer shall have worked in a similar capacity on at least five (5) projects similar in complexity to the project described in the Contract Documents and with each project involving at least 100,000 square feet of a similar product.

2. Installation supervisor/field engineer shall have worked in a similar capacity on at least two (2) jobs similar in size and complexity to the project described in the Contract Documents.

3. The manufacturer shall perform the quality control tests listed in Table 4 at the manufacturing plant. Provide all quality control certificate to the Engineer as specified in Section 623.03(B) of these Special Provisions.

TABLE 4. GEOMEMBRANE SPECIFICATIONS

PROPERTY	TEST METHOD	REQUIREMENT		
		DEMO CAP & TEMP CAMU CAP	CAMU CELL	CAMU CAP
Gauge (mils nominal)	ASTM D-1593	20	60	40
Tear Strength (pounds)	ASTM D 1004 or ASTM D 751	125	42	28
Tensile Strength 1. Yield Stress (lb/in) 2. Break Stress (lb/in) 3. Yield Elongation (%) 4. Break Elongation (%)	ASTM D 6693 or ASTM D 2261	340	 126 90 12 100	84 60 12 100
Puncture Resistance (lb)	ASTM D 4833	150	90	60
Stress Crack Resistance (Hours)	ASTM D 5397 Appendix	N/A	300	300

B. Delivery, Storage and Handling

1. Deliver geomembrane to the site only after the Engineer receives and approves the required submittals. Immediately remove damaged or unacceptable material from the site and replaced at no cost to the Owner.

2. Store geomembrane on pallets to protect from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, direct heat of the sun or other damage. Stack geomembrane no more than 3 rolls or 1 pallet high.

3. Repair all geomembrane damaged during handling to the satisfaction of the Engineer. Immediately remove from the site and replace geomembrane determined by the Engineer to be irreparably damaged. Repair, removal and replacement shall be solely at the Contractor's expense.

C. Warranty

1. The geomembrane installer shall warrant his workmanship to be free of defects for one (1) year after final acceptance of the work. This warranty shall include, but not be limited to, all seams, anchor trenches, geomembrane attachments to appurtenances, and penetration seals. The installer shall also obtain and furnish the Owner a material warranty from the geomembrane manufacturer. The material warranty shall be for defects or failure due to weathering for ten (10) years after final acceptance.

2. Should a defect or failure occur within the aforesaid periods, the installer shall bear all costs for repair and/or replacement of the geomembrane and shall in addition bear all costs for the excavation of any cover backfill that is required to be removed in order to repair and/or replace the geomembrane. All materials removed to allow repairs to be made shall be reinstalled by the installer in accordance with these Contract Documents.

623.03 SUBMITTALS

A. Submit the following documents to the Engineer no later than three (3) weeks prior to installation of the geomembrane:

1. Complete written instructions for storage, handling, installation and seaming of the geomembrane which are in compliance with the Specifications and conditions of warranty.

2. Panel layout drawings showing both fabricated and field seams, and details not conforming with the Drawings (if any).

3. Qualification of the geomembrane installer, including the resume of the field engineer installation supervisor to be assigned to this project, including dates and duration of employment.

4. Installer's Quality Control Manual.

B. Submit the following documents to the Engineer prior to the shipment of the geomembrane to the site.

1. Polymer compound data

    a) Statement of production date or dates.
    b) Laboratory certification that the materials meet Specifications.
    c) Certification that all materials are from the same manufacturer.
    d) Copy of quality control certificates issued by manufacturer.
    e) Statement that no reclaimed polymer is added to the compound.

2. Geomembrane data.

    a) Statement of production date or dates
    b) Laboratory certification that the materials meet the Specification.
    c) Copy of quality control certificates issued by the manufacturer.
    d) Reports of tests defined in Table 5-1 from the manufacturer.

TABLE 5-1. MANUFACTURER'S QA TESTS FOR FML

Property	Test Method	Test Frequency	Test Standard(1)			Rejection Criteria
			OR RPE	HDPE 60 mil	HDPE 40 mil	
Gauge (mils nominal)	ASTM D-1593	1 per lot	20	60	40	Material must meet all standards before delivery to site
Tear Strength (pounds)	ASTM D-1004		70	42	28	
Tensile Strength	ASTM D-638 Type IV		300			
5. Yield Stress (lb/in)				126	84	
6. Break Stress (lb/in)				90	60	
7. Yield Elongation (%)				12	12	
8. Break Elongation (%)				100	100	
Puncture Resistance (lb)	ASTM D-4833		150	90	60	
Stress Crack Resistance (Hours)	ASTM D-5397		N/A	300	300	
Specific Gravity	ASTM D-1505			≥0.94	≥0.94	

Notes:
(1) Values shown are minimum average roll values.

C. Submit the following to the Engineer prior to start of the FML installation:

1. Warranties for material and installation as specified hereinafter for review to the Owner.

2. Certificate of acceptance of prepared subgrade for each area to be covered by an HDPE FML, signed by the installation supervisor.

D. During installation, submit to the Engineer results of Contractor quality control testing as specified in 623.06 TESTING.

E. Upon completion of the installation, submit to the Engineer the following:

1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents.

2. Manufacturer's and Installer's warranties as specified hereinafter.

3. Record drawings showing location of panels, seams, repairs, patches, and destructive samples, including detailed measurements.

623.04 MATERIALS

A. Description of Materials

1. Geomembrane liner shall be top quality products, recommended by the manufacturer for this specific type of work, and shall have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes.

2. Extrudate Rod or Bead shall be made from the same resin as the geomembrane liner with carbon black. Additives shall be thoroughly dispersed in the extrudate.

B. Physical Characteristics

The HDPE geomembrane liner:

1. Shall be textured on both sides.

2. Shall be formulated from a high density polyethylene resin with a specific gravity greater than or equal to 0.94. All resins shall be of the same type and no batch shall be blended with recycles or seconds.

3. Shall be uniform in color, thickness, and size. The material shall be a flexible, durable, watertight product free of pinholes, blisters, holes, bubbles, gels, undispersed resins or carbon black, and other contaminants. Processing aides, antioxidants and other additives shall not exceed a combined maximum total of 1 percent by weight, ignoring carbon black, and 3.5 percent by weight including carbon black.

4. Shall have the minimum physical property characteristics, as outlined in Table 4. Certified test results showing that the sheeting meets or exceeds the Specification shall be submitted per Section 623.03.

5. Shall be supplied in rolls labeled with thickness, length, width, manufacturer, plant location, and identification number.

The RPE geomembrane shall be OR RPE 25 as supplied by Layfield Plastics or an approved equal. The geomembrane shall conform to the manufacturer's material properties table. All values are Typical Values unless otherwise noted.

623.05 INSTALLATION

A. Subgrade Preparation

The subgrade to be lined:

1. Shall be maintained in a dry enough condition for equipment to operate without rutting.

2. Shall be smooth and free of projections and sharp objects that can damage the lining. Remove rocks, hard clods, and other such material, and roll the subgrade so as to provide a smooth compact surface. The smoothed subgrade will limit liner bridging to less than 1 inch.

3. Shall be inspected prior to geomembrane installation to ascertain its suitability for installation in compliance with the terms of the product warranty and the requirements of this Specification. For HDPE geomembranes, submit to the Engineer a signed certification that the prepared subgrade surface is satisfactory. Installation of geomembrane without providing written certification shall constitute acceptance of the subgrade by the Contractor.

4. Shall have round edges at anchor trenches or edges shall be cushioned with geotextile and backfill.

B. Geomembrane Installation

1. Only layout the amount of geomembrane that can be seamed during that same day. Assign each panel a simple and logical identifying code number or letter. For HDPE geomembrane, identify the panels with each appropriate code on the layout design referenced in 623.03 A.2.

2. Do not damage geomembrane by handling, traffic, or leakage of hydrocarbons or any other means. Do not wear damaging shoes or engage in activities that could damage the geomembrane. Open or unroll geomembrane panels using methods that will not damage, stretch or crimp the geomembrane. Prevent excess condensation on the geomembrane such that the underlying surface is not adversely impacted. Protect underlying surface from damage. Provide sufficient material to allow for geomembrane shrinkage and contraction. Use methods that minimize wrinkles between adjacent panels. Place ballast on geomembrane to prevent uplift from wind. Use ballast that will not damage geomembrane. Do not allow vehicle traffic directly on geomembrane. Remove folded or wrinkled material that exceeds 6 inches in width. Visually inspect geomembrane for imperfections. Mark faulty or suspect areas for testing and/or repair. Any portion of the lining damaged during installation shall be removed or repaired by using an additional piece of the same membrane as specified herein. The liner shall be installed in a relaxed condition and shall be free of stress or tension upon completion of the installation. Stretching the liner to fit is not

permissible. Backfill anchor trenches as soon as possible after installation of liner and geocomposite, if applicable.

3. Place and seam geomembrane only when ambient temperatures, measured six inches above the geomembrane, are between 40 degrees F and 100 degrees F, unless otherwise specified or approved. Installation below 40 degrees F shall occur only after verifying that the geomembrane can be seamed according to Specifications and approval by the Engineer. Do not install geomembrane during precipitation, in the presence of excessive moisture, in areas of ponded water, or in the presence of excessive winds. Protect the geomembrane from wind uplift during installation through the use of sand bags or other suitable weights.

4. Repair all damaged geomembrane and test damaged areas prior to backfilling.

C. Pipe Boots. Fit and seal pipes, manholes, and other penetrations of the geomembrane with shop fabricated boots as shown on the Drawings. Match the flange portion of the boot to the angle of the slope or bottom where the pipe or manhole enters the liner for a smooth fit without excess stretching of the material.

D. Seaming

1. Seam Layout shall:

   a) Orient seams parallel to line of maximum slope, i.e., orient down, not across, slope.
   b) Keep butt seams at least ten (10) feet horizontally away from toe of slope.
   c) For HDPE geomembrane, use seam numbering system compatible with panel numbering system.

2. Trial field seaming shall be accomplished by the Contractor on-site for HDPE FMLs.

   a) Conduct trial seams on pieces of geomembrane to verify adequate seaming methods and conditions.

   b) Conduct trial seams:

      1) At beginning of each seaming period;
      2) At least once for each four seaming hours;
      3) For each seaming apparatus in use;
      4) At least once per shift for each person performing seaming; and
      5) Whenever changes in climatic conditions could effect seam quality.

   c) Make test seam in the location of seaming and in contact with subgrade or geosynthetic (same condition as the geomembrane to be seamed).

d) Make test seam sample at least two (2) feet long and eleven (11) inches wide with the seam centered lengthwise.

e) Cut two, 1-inch wide test strips from opposite ends of the trial seams.

f) Cut specimens constant 1-inch wide and clamp at 90 degree angle in tensiometer.

g) Quantitatively test field specimens for peel adhesion (ASTM D3083) first, and bonded seam strength (ASTM 3083) second. Insure that these tests are performed in this order.

h) A trial seam sample passes when the following results are achieved for both tests.

1) The break is film tearing bond (FTB);
2) The break is ductile; and
3) The strength of break is at least 80% of the specified sheet strength.

i) Repeat the trial seam in its entirety if one (1) of the trial seam samples fails in either peel or shear mode.

j) Notify Engineer when repeated trial seam fails and do not continue seaming until deficiencies or adverse conditions are determined and corrected, and two (2) consecutive successful trial seams are achieved.

3. Use the following seaming procedure for HDPE geomembranes.

a) Do not begin seaming on liner until all trial seam test samples made by the equipment to be used passes tests as defined above.

b) Form seams per manufacturers written instructions. Wipe the contact surfaces of the panels clean to remove all dirt, dust or other substance. Use solvent for cleaning contact surfaces of field joints and for other required uses as recommended by the manufacturer. Apply a hot wedge or hot knife seaming tool to the overlapped panel edges creating a continuous thermal bond between the panels. Smooth out any wrinkles. Field seams shall have a strength of at least 80% of the specified sheet strength.

c) Extend seaming to the outside edge of panels to be placed under the anchor berm and in the anchor trench.

d) If there is not firm substrate, use a seaming board directly under the seam overlap to achieve proper support.

e) If seaming operations are carried out at night, provide adequate illumination.

f) Cut fish mouths or wrinkles at the seam overlaps along the ridge of the wrinkle in order to achieve a flat overlap. Seam the cut fish mouths or wrinkles and patch any portion where the overlap is less than three (3) inches with an oval or round patch of the same geomembrane extending a minimum of six (6) inches beyond the cut in all directions.

g) Seam only when ambient temperature, measured 6 inches above the geomembrane is between 40 degrees F and 100 degrees F unless other limits are accepted, in writing, by the Engineer.

4. Use a stitched "Z" fold for RPE geomembranes.

E. Defects and Repairs

1. Inspection

a) During installation and seaming, visually examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of the examination. Mark areas suspected of deficiencies. Remove areas of geomembrane requiring more than one patch per 5,000 square feet and replace at no additional cost to the Owner.

b) Repair each suspect location both in seam and non-seam areas shall be repaired and non-destructively tested. Do not proceed with work which will cover locations which have been repaired until passing test results are achieved.

2. Repair Procedures

a) Repair all portions of the geomembrane exhibiting a flaw, or failing a destructive or non-destructive test. Provide a written recommendation for method of repair to the Engineer prior to initiating repair and obtain approval of the repair procedure from the Engineer prior to making repair. Methods which are acceptable to the Engineer and their application are as follows:

1) Capping. Cap for repair of large lengths of failed seams.
2) Patching. Patch large (over 3/8 inch diameter) holes, tears (over 2 inches long), undispersed raw material, and contamination by foreign matter.
3) Remove and Replace. Remove the unsatisfactory material and replace with new material seamed into place.

b) In addition

1) Abrade surfaces of the geomembrane which need repaired no more than one-half (1/2) hour prior to the repair.
2) Clean and dry all surfaces at the time of repair.

3) Extend patches or caps at least six (6) inches beyond the edge of the defect and all corners of patches shall be rounded with a radius of at least three (3) inches.
4) Cut the geomembrane below large caps to avoid water or gas collection between the sheets.

c) Nondestructively test each repair using the methods described in Section 623.06 of these Special Provisions. Repairs which pass the non-destructive test shall be considered an adequate repair. Large caps shall be of sufficient length to require destructive test sampling, at the discretion of the Engineer. Redo repairs that have failed tests and retest until a passing test results.

623.06 TESTING

A. General

1. Quality control testing, including laboratory testing, field seam testing, and destructive testing in accordance with Table 5-2 shall be performed by the Contractor and observed at the discretion by the Engineer.

2. HDPE field seams shall be non-destructively tested over their full length by pressurizing the seam for dual-hot-wedge method seams in the HDPE geomembranes, or using a vacuum test unit, air lance, or other approved method for seams in RPE geomembranes or in HDPE geomembranes where the dual-hot-wedge method could not be used. Non-destructive testing shall be carried out as the seaming progresses, not at the completion of all the field seaming.

B. Vacuum Testing

1. The equipment shall consist of the following:

a) A vacuum box assembly.

b) A steel vacuum tank and pump assembly equipped with a pressure control and pipe connections.

c) A rubber pressure/vacuum hose with fittings and connections.

d) A soapy solution and applicator.

2. The following procedures shall be followed:

a) Energize the vacuum pump and reduce the tank pressure to approximately ten (10) inches of water.

b) Place the box over the wetted seam area (soapy solution).

TABLE 5-2. QUALITY CONTROL CRITERIA FOR FML

Parameter	Test Method	Frequency	Standard	Test Rejection Criteria
Surface Conditions	Visual Inspection	100%	No holes, ridges, voids, rocks, roots, ruts or other non-conformities	Reject and replace all surfaces with any of the items at left
Anchor Trenches	Visual/Tape Measure	100%	See dimensions on project plans	Reject and repair all non-conforming trenches
FML Placement	Visual	100%		Reject and replace non-conforming panels
Seaming	Visual	100%		
Seam Tensile Strength (HDPE only)	ASTM D-638, type M-1	1 per 500 feet of seam	Base material properties – see Table 5-1	Reject and replace non-conforming seams
Seam Shear & Peel (HDPE only)	ASTM D-4437	1 per 500 feet of seam	Shear strength: 120 lb/in – 60 mil 80 lb/in – 40 mil Peel strength: 91 lb/in(2) – 60 mil 78 lb/in(3) – 60 mil 60 lb/in(2) – 40 mil 52 lb/in(3) – 40 mil	Reject and replace non-conforming seams
Trial Seam	ASTM D-3083	1) Beginning of each shift of seaming and every four hours thereafter 2) At any change in seam operator, equipment or weather	Break must be a ductile film tear with at least 80% of minimum sheet strength	Repeat trial seaming until standard is met
Air lance Vacuum Box or Internal Pressure(3)	ASTM D-4437 ASTM D-4437 or As described in specifications	100%	Ripples or bubbles Bubbles emerging from seams Loss of pressure ≤4 psi in 7 minutes	Identify, repair and replace leaking seams

Notes:

(1) Hot wedge seams only
(2) Extrusion fillet weld only
(3) HDPE

c) Ensure that a leak-tight seal is created.

d) For a period of not less than fifteen (15) seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.

e) All areas where soap bubbles appear shall be marked and repaired in accordance with repair procedures described in Section 623.05E.

f) Conduct vacuum testing per ASTM 4437.

C. Air Lance Testing

1. Equipment shall consist of an air lance that can provide a minimum air pressure of 30 psi and a maximum air pressure of 40 psi.

2. The following procedures shall be followed:

a) The air nozzle shall be held at a 45 degree angle to the field seam approximately 2" off the edge of the material.

b) The air shall be directed toward the seam edge, upper edge and surface to detect loose edges.

c) Riffles indicating unbonded areas within the seam or other undesirable seam conditions shall be patched in accordance with repair procedures described in Section 623.05 (E). The patch should then be tested using the same air lance test method.

d) Conduct air lance testing per ASTM 4437.

D. Destructive Testing of Seams in HDPE FMLs

1. The Engineer will direct the Contractor to perform destructive seam tests at selected locations. The purpose of these tests is to evaluate seam strength. Perform seam strength testing as the seaming work progresses, not at the completion of all field seaming.

2. Location and Frequency

a) Collect destructive test samples shall be collected at a minimum frequency of one (1) test location per five hundred (500) feet of seam length, unless otherwise directed by the Engineer.

b) Samples, in addition to the minimum frequency, shall be taken as required by the Engineer.

c) Test location shall be determined during seaming and may be prompted by suspicion of insufficient adhesive, contamination, offsets, or any other potential cause of imperfect seaming. The Engineer will select the locations. The Engineer will not notify the Installer in advance of selecting locations where seam samples will be taken.

d) The Engineer reserves the right to increase the frequency in accordance with the actual performance results of samples taken.

3. Sampling Procedure

a) Samples shall be cut at locations designated by the Engineer as the seaming progresses in order to obtain laboratory test results before the geomembrane is covered by another material. Each sample shall be numbered and the sample number and location identified on the panel layout drawing.

b) All holes in the geomembrane resulting from destructive sampling shall be immediately repaired in accordance with repair procedures specified in Section 623.05 (E).

4. Size of Samples. The samples shall be eleven (11) inches wide by twenty-four (24) inches long with the seam centered lengthwise. Two (2) 1-inch wide strips shall be cut from each end of the sample and these shall be tested (shear and peel) in the field by the installer. The remaining sample shall be cut into two (2) parts and distributed as follows:

a) One (1) portion for the Contractor, eleven (11) inches by eleven (11) inches.

b) One (1) portion to the Engineer or archive storage, eleven (11) inches by eleven (11) inches

5. Field Testing. The two (2), one (1) inch wide strips described in Section 623.06 (D)(4) shall be tested in the field by the installer and witnessed by the Engineer, by tensiometer, for peel and shear, respectively. Test strips shall meet the peel and shear values specified for trial seams in Section 623.05 (D)(2). If any field test sample fails to pass, then the procedures outlined in that Section shall be applied.

6. Procedures for Destructive Test Failure. The following procedures shall apply whenever a sample fails the destructive test, whether performed by field or laboratory testing:

a) The seam shall be reconstructed between any two (2) passed test locations, or

b) The seaming path can be traced to an intermediate location (at least ten (10) feet minimum from the location of the failed test in each direction) and a small sample taken for an additional field test at each location. If these additional samples pass

the field tests, then full laboratory samples shall be taken. If these laboratory samples pass, then the seam shall be reconstructed between these locations. If either sample fails, then the process shall be repeated to establish the zone in which the seam should be reconstructed.

7. Acceptance of Seams - All acceptable seams must be bounded by two (2) locations from which samples passing laboratory destructive tests have been taken. In cases exceeding one hundred and fifty (150) feet of reconstructed seam, a sample taken from within the reconstruction zone must pass destructive testing. Whenever a sample fails, additional testing may be required for seams that were seamed by the same personnel and/or apparatus or seamed during the same time shift.

E. Geomembrane Wrinkle. When seaming of a geomembrane liner is completed, or when seaming of a large area of a geomembrane liner is completed, and prior to placing overlying materials, the Engineer shall identify the location of excessive geomembrane wrinkles. Wrinkles so identified shall be cut, re-seamed and tested.

F. Seams That Cannot Be Non-Destructively Tested. The following procedures shall apply to locations where seams cannot be non-destructively tested:

1. All such seams shall be cap-stripped with the same geomembrane.

2. If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.

G. Engineering Observation. If the seam cannot be tested prior to final installation, the seaming and cap-stripping operations shall be observed by the Engineer and Contractor for uniformity and completeness.

H. Geomembrane Acceptance. The Contractor shall retain ownership and responsibility for the geomembrane until acceptance by the Owner. The geomembrane shall be accepted by the Owner when:

1. Conformance test results meet the requirements of the Contract Documents.

2. Required documentation including warranty from the manufacturer, fabricator and installer has been received and accepted.

3. The installation is complete and accepted by the Engineer.

4. Verification of the adequacy of all field seams and repairs, including associated testing, is complete.

5. Written certification documents, including as-built drawings, have been received by the Engineer.

623.07 ANCHORAGE

Anchor CAMU liners using edge trenches as shown on the drawings. Anchor RPE for cleaning and demolition caps using treated 2 x 4 lumber or metal straps as shown on the drawings.

SECTION 624 - GEOCOMPOSITE

Add the following new section:

624.01 DESCRIPTION

The work covered by these Specifications consists of furnishing and installing high density polyethylene (HDPE) geonet heat bonded and sandwiched between two layers of 8 oz/yd^2 non-woven geotextile where shown on the Drawings or directed by the Engineer.

624.02 MATERIALS

A. Drainage Net

The drainage net shall be manufactured by extruding two sets of polyethylene strands to form a three dimensional structure to provide for planar flow. The drainage net shall be manufactured of polyethylene resin produced in the United States and compounded and manufactured specifically for the intended application. The natural polyethylene resin without the carbon black shall meet the following requirements:

Property	Test Method	Requirements
Density, g/cc	ASTM D 1505 or ASTM D 792	0.945 - 0.955
Melt Index, g/10 min.	ASTM D 1238 Condition E	< 1.0

Labels on each roll shall identify the thickness of the material, the width and length of the roll, lot and roll numbers, and name of the manufacturer. The drainage net rolls shall meet the requirements in this specification.

B. Geotextile

The geotextile shall be a non-woven, needle punched polyester or polypropylene fabric manufactured in the United States for the specific application. The geotextile rolls shall be 15 feet wide and shall meet the requirements in this specification.

C. Geocomposite

The geocomposite shall consist of the HDPE drainage net heat bonded and sandwiched between two layers of geotextile to create a double-sided geocomposite. The geocomposite shall be 13.5 feet wide. The geotextiles shall extend a minimum of 6 inches beyond the edges of drainage net on both sides of the geocomposite roll. The geotextile shall not be bonded to the drainage net within 6 inches from the edges of the rolls.

Materials shall have the minimum physical property characteristics, as outlined in Table 5 and Table 6. Certified test results showing that the sheeting meets or exceeds the Specification shall be submitted per Section 624.03 (E).

TABLE 5. GEONET SPECIFICATIONS

PROPERTY	TEST METHOD	MINIMUM REQUIREMENT
Thickness (mils nominal)	ASTM D-751	250.0
Compressive Strength (pounds/inch^2)	ASTM D 1621	100.0
Transmissivity @ 4000 psf (gal./min./ft.)	ASTM D 4716	0.5

TABLE 6. GEOTEXTILE SPECIFICATIONS

PROPERTY	TEST METHOD	MINIMUM REQUIREMENT
Unit Weight (oz/yd^2)	ASTM D-5261	8
Grab Strength (pounds)	ASTM D 4632	200
Permittivity (sec^{-1})	ASTM D 4491	1.3
UV Stability, % ret. (500 hr)	ASTM D 4355	70

624.03 INSTALLATION

A. Surface Preparation

1. Prior to deployment of the geocomposite, the Contractor shall inspect the underlying geomembrane surface to ascertain its suitability for installation in compliance with the terms of the product warranty and the requirements of this Specification.

2. Round edges of anchor trenches as recommended by the geocomposite manufacturer or cushion with geotextiles and backfill.

B. Geocomposite Installation

1. Only install enough panels that can be secured during that same day.

2. Do not damage geocomposite by handling, traffic, or leakage of hydrocarbons or any other means. Do not wear damaging shoes or engage in activities that could damage the geomembrane. Open or unroll geocomposite panels using methods that will not damage, stretch or crimp the geocomposite. Use methods that minimize wrinkles between adjacent panels. Place ballast on geocomposite to prevent uplift from wind. Use ballast that will not damage geocomposite. Repair damage to underlying materials prior to completing deployment of geocomposite. Do not allow vehicle traffic directly on geocomposite. Remove folded material. Visually inspect geocomposite for imperfections. Mark faulty or suspect areas for repair. Any portion

of the geocomposite damaged during installation shall be removed or repaired by using an additional piece of the same geocomposite as specified herein. The geocomposite shall be installed in a relaxed condition and shall be free of stress or tension upon completion of the installation. Stretching the geocomposite to fit is not permissible. Backfill anchor trenches.

C. Securing Geocomposite

1. Seam Layout shall meet the following requirements:

   a) Orient seams parallel to line of maximum slope, i.e., orient down, not across, slope.

2. The seaming procedure used shall be as follows:

   a) Field connections will be made to secure factory fabricated panels or rolls of geocomposite together in the field. Connections shall be formed by lapping the edges of panels a minimum of 2 inches. Any wrinkles shall be smoothed out.

   b) Secure overlapped edges of the geonet by plastic ties approximately every five (5) feet along the panel length. Use plastic ties that are white or a bright color for easy inspection. Do not use metallic ties.

   c) Extend connections to the outside edge of panels to be placed under the anchor berm and in the anchor trench.

   d) If securing operations are carried out at night, provide adequate illumination.

D. Defects and Repairs

1. Inspection

   a) During installation and securing, examine all areas of the geocomposite for defects, tears, undispersed raw materials and all sign of contamination by foreign matter. The surface of the geocomposite shall be clean at the time of the examination. Mark all areas suspected of deficiencies.

   b) Repair each suspect location.

2. Repair Procedures

   a) Repair all portions of the geocomposite exhibiting a flaw by removing the unsatisfactory material and replacing with new material that is overlapped and secured in place.

E. Geocomposite Acceptance. The Contractor shall retain ownership and responsibility for the geocomposite until acceptance by the Owner. The geocomposite shall be accepted by the Owner when:

1. Conformance test results meet the requirements of Table 6-1.

2. Required documentation including warranty from the manufacturer, fabricator and installer has been received and accepted.

3. The installation is complete and accepted by the Engineer.

4. Written certification documents, including as-built drawings, have been received by the Engineer.

5. Submittals shall be the same as those required for geomembrane in Section 623.

TABLE 6-1. CONFIRMATION SAMPLING FOR GEOCOMPOSITES

PARAMETER	TEST	MINIMUM TEST FREQUENCY	REJECTION CRITERIA
Crush Strength	ASTM D-1621	1 per lot[1]	Reject any lot sampling unit or lots that do not meet ASTM-D-4759, Section 5.
Thickness	ASTM D-5199	1 per lot[1]	Reject any lot sampling unit or lots that do not meet ASTM-D-4759, Section 5.
Transmissivity	ASTM D-4716 Width @ 14.5 psi Normal pressure & 0.1 ft/ft hydraulic	1 per lot[1]	Reject any lot sampling unit or lots that do not meet ASTM-D-4759, Section 5.

Notes:

(1) A lot is the smaller of 100,000 square feet or one production run.

SECTION 625 - GEOSYNTHETIC CLAY LINER (GCL)

Add the following new section:

625.01 DESCRIPTION

A. The work covered by these Specifications consists of furnishing and installing geosynthetic clay liner (GCL where shown on the Drawings or directed by the Engineer.

B. **Definitions Used In This Section**

Geosynthetic Clay Liner (GCL). A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics. The GCL will be reinforced.

Minimum Average Roll Value. The minimum average value of a particular physical property of a material, for 95 percent of all of the material in the lot.

Overlap. Where two adjacent GCL panels contact, the distance measuring perpendicular from the overlying edge of one panel to the underlying edge of the other.

625.02 QUALITY ASSURANCE

1. Manufacture's Qualifications:
   The GCL manufacturer must have produced at least 10 million $ft^2$of GCL, with at least 8 million square feet installed.

2. Installer's Qualifications:
   The GCL installer must either have installed at least 1 million ft^2 of GCL, or must provide to the Engineer satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the GCL will be installed in a competent, professional manner.

3. Product Quality Documentation:
   The GCL manufacturer shall provide the Engineer with manufacturing QA/QC certification for each shipment of GCL. The certifications shall be signed by a responsible party employed by the GCL manufacturer and shall include:
   a) Certificates of analysis for the bentonite clay used in GCL production demonstrating compliance with the parameters swell index and fluid loss.
   b) Manufacturer's test data for finished GCL product(s) of bentonite mass/area, GCL tensile strength and GCL peel strength (if applicable) demonstrating compliance with the index parameters.
   c) GCL lot and roll numbers supplied for the project (with corresponding shipping information).
   d) Manufacturer's test data for finished GCL product(s) of GCL index flux, permeability and hydrated internal shear strength data demonstrating compliance with the performance parameters.

4. Delivery, Storage and Handling
   a) Deliver GCL to the site only after the Engineer receives and approves the required submittals. Damaged or unacceptable material shall be immediately removed from the site and replace at no cost to the owner.
   b) Prior to shipment, the GCL manufacturer shall label each roll, identifying:
      (1) Product identification information (Manufacturer's name and address, brand name, product code).
      (2) Lot number and roll number.
      (3) Roll length and weight.
   c) The GCL shall be wound around a rigid core whose diameter is sufficient to facilitate handling. The core is not necessarily intended to support the roll for lifting but should be sufficiently strong to prevent collapse during transit.
   d) All rolls shall be labeled and bagged in packaging that is resistant to photodegradation by ultraviolet (UV) rays.
   e) The manufacturer assumes responsibility for initial loading the GCL. Shipping will be the responsibility of the party paying the freight. Unloading, on-site handling and storage of the GCL are the responsibility of the Contractor, Installer or other designated party.
   f) A visual inspection of each roll should be made during unloading to identify if any packaging has been damaged. Rolls with damaged packaging should be marked and set aside for further inspection. The packaging should be repaired prior to being placed in storage.
   g) The party responsible for unloading the GCL should contact the manufacturer prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment.
   h) Storage of the GCL rolls shall be the responsibility of the installer. Ad dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry and well-drained.
   i) Rolls should be stored in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls. Rolls should be stacked at a height no higher than that at which the lifting apparatus can be safely handled (typically no higher than four).
   j) All stored GCL materials and the accessory bentonite must be covered with a plastic sheet or tarpaulin until their installation.
   k) The integrity and legibility of the labels shall be preserved during storage.

5. Warranty

   a) The installer of the GCL to be used in the work shall warrant his workmanship to be free of defects for two (2) years after final acceptance of the work. This warranty shall include, but not be limited to, all seams, anchor trenches, GCL attachments to appurtenances, and penetration seals. The GCL installer shall also obtain and furnish the Owner a warranty from the GCL manufacturer for the materials used. The material warranty shall be for defects or failure due to weathering for 10 years, with

temperatures ranging from (-) minus 30 degrees Fahrenheit to (+) plus 110 degrees Fahrenheit, after the completion of the work on a prorata basis.

b) Should a defect or failure occur within the aforesaid periods, the GCL installer shall bear all costs for repair and/or replacement of the GCL and shall in addition bear all costs for the excavation of any cover backfill that is required to be removed in order to repair and/or replace the GCL. All materials removed to allow repairs to be made shall be reinstalled by the GCL installer in accordance with these special provisions.

625.03 SUBMITTALS

Two copies of the following documents shall be submitted by the Contractor at least three weeks prior to the shipment of the GCL to the site.

1. Conceptual description of the proposed plan for placement of the GCL panels over the area of installation.
2. GCL manufacturer's MQC Plan for documenting compliance of these specifications.
3. A representative sample of the GCLs.
4. A project reference list for the GCL(s) consisting of the principal details for at least ten projects totaling at least 10 million square feet in size.
5. Upon shipment, the Contractor shall furnish the GCL manufacturer's Quality Assurance/Quality Control (QA/QC) certifications to verify that the materials supplied for the project are in accordance with Table 7-1.

625.04 MATERIALS

1. The GCL shall be a needle punched reinforced GCL comprised of a uniform layer of granular sodium bentonite encapsulated between a scrim reinforced non-woven and a virgin staple fiber non-woven geotextile and shall comply with all of the criteria listed in this specification. The needle punched fibers should be thermally fused to the scrim reinforced non-woven geotextile to enhance the reinforcing bond.
2. Reinforced GCL shall be used on this project.
3. The minimum acceptable dimensions of full-size GCL panels shall be 150 feet in length and 13.8 feet in width. Short rolls (those manufactured to a length greater than 70 feet but less than a full-length roll) may be supplied at a rate no greater than 3 per truckload or 3 rolls every 36,000 square of GCL, whichever is less.
4. A 12 -inch overlap guideline shall be imprinted on both edges of the upper geotextile component of the GCL as a means for providing quality assurance of the overlap dimension. Lines shall be printed in easily visible, non-toxic ink.
5. The granular bentonite or bentonite sealing compound used for seaming, penetration sealing and repairs shall be made from the same natural sodium bentonite as used in the GCL and shall be as recommended by the GCL manufacturer.

TABLE 7-1. ACCEPTANCE TESTING FOR GCL

Parameter	Test Method	Frequency	Test Standard	Rejection Criteria
Mass per Unit Area	ASTM D-5993	1 per lot[1]	0.75 lb/ft^2 MIN	Materials must pass all acceptance testing before delivery to site
Hydraulic Conductivity	ASTM D-5887		5 x 10^{-9}cm/sec MAX	
Shear Strength	ASTM D-5321		500 psf MIN	
Peel Strength	ASTM D-4632		15 lbs MIN	

Notes:

(1) All material used on the project must be from the sampled lot.

625.05 GCL INSTALLATION

The Contractor shall install the geosynthetic clay liner (GCL) in accordance with the plans and with these special provisions. In the event of conflict, the more stringent procedure shall apply unless approved otherwise by the Engineer and EPA.

625.05.1 Subgrade Preparation

The subgrade to receive GCLs shall be prepared and compacted in accordance with the project specifications and plans, and shall be smooth, firm, and free of: vegetation, construction debris, sticks, sharp rocks, ice, abrupt changes in elevation, standing water, cracks larger than one-quarter inch in width, and any other foreign matter that could contact the GCL.

625.05.2 Placement

1. Needle punched GCL shall be placed on top of the Compacted Clay Liner and on the site wide cap as shown on the plans.

2. GCL rolls should be delivered to the working area of the site in their original packaging. Immediately prior to deployment, the packaging should be carefully removed without damaging the GCL. The orientation of the GCL (i.e., which side faces up) should be in accordance with the Engineer's or manufacturer's recommendations. Unless otherwise specified, however, the GCL shall be installed such that the product name printed on one side of the GCL faces up.

3. Subgrade slope transitions will be uniformly curved and smooth prior to placement of the GCL. Care shall be taken when placing GCL that the subgrade is free of sharp changes in slope and uneven or variable radius curved transitions which may lead to unacceptable wrinkles or poor contact with the subgrade.

4. Equipment which could damage the GCL shall not be allowed to travel directly on it. If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement continues.

5. Care must be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL. A temporary geosynthetic subgrade covering commonly known as a skip sheet or rub sheet may be used to reduce friction damage during placement.

6. The GCL shall be placed so that seams are parallel to the direction of the maximum slope. Seams should be located at least 3 feet from the toe and crest of slopes steeper than 4H:1V.

7. All GCL panels should lie flat on the underlying surface, with no wrinkles or fold, especially at the exposed edges of the panels.

8. Only as much GCL shall be deployed as can be covered at the end of the working day with soil, a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it will be removed and replaced. The Engineers, CQA inspector, and GCL supplier should be consulted for specific guidance if premature hydration occurs.

625.05.3 Anchorage

As directed by the Plans, the end of the GCL roll shall be placed in an anchor trench at the top of the slope. The front edge of the trench should be rounded so as to eliminate any sharp corners. Loose soil should be removed from the floor of the trench. The GCL should cover the entire trench floor and the rear trench wall.

625.05.4 Seaming

1. The GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Supplemental bentonite is required if the GCL has one or more non-woven needle-punched geotextiles.

2. The minimum dimension of the longitudinal overlap should be 12 inches. End-of-roll overlapped seams should be similarly constructed, but the minimum overlap should measure 24 inches.

3. Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone.

4. Bentonite-enhanced seams are constructed between the overlapping adjacent panels and described above. The underlying edge of the longitudinal overlap is exposed and then a continuous bead of granular sodium bentonite is applied along a zone defined by the edge of the underlying panel and the 6-inch line. A similar bead of granular sodium bentonite is applied at the end-of-roll overlap. The bentonite shall be applied at a minimum application rate of one quarter pound per lineal foot.

625.05.5 Detail Work

1. The GCL shall be sealed around penetrations and embedded structures embedded in accordance with the design drawings and the GCL manufacturer.

2. Cutting the GCL should be performed using a sharp utility knife. Frequent blade changes are recommended to avoid damage to the geotextile components of the GCL during the cutting process.

625.05.6 Damage Repair

If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area. The patch shall be obtained from a new GCL roll and shall be cut to size such that a minimum overlap of 12 inches is achieved around all of the damaged area. Dry bentonite or bentonite mastic shall be applied around the damaged area at a rate of one-half pound per square foot prior to placement of the patch. The Contractor may wish to use an adhesive to affix the patch in place so that it is not displaced during cover placement.

625.05.7 Cover Placement

1. Although direct vehicular contact with the GCL is to be avoided, lightweight, low ground pressure vehicles (such as 4-wheel all-terrain vehicles) may be used to facilitate the installation of geosynthetic material placed over the GCL. The GCL supplier or CQA engineer should be contacted with specific recommendations on the appropriate procedures in this situation.

2. When a textured geomembrane is installed over the GCL, a temporary geosynthetic covering known as a slip sheet or rub sheet should be used to minimize friction during placement and to allow the textured geomembrane to be more easily moved into its final position.

3. Cyclical wetting and drying of GCL covered only with geomembrane can cause overlap separation. A soil cover should be placed promptly over the geomembrane covering the GCL where applicable, however, do not place soil cover directly on the GCL. Geomembranes should be covered with a white geotextile and/or operations layer without delay to minimize the intensity of wet/dry cycling. If there is the potential for unconfined cyclic wetting and drying over an extended period of time, the longitudinal seam overlaps should be increased based on the project engineer's recommendations.

4. To avoid seam separation, the GCL should not be put in excessive tension by the weight or expansion of textured geomembrane on steep slopes. The project Engineer should be consulted about the potential for GCL tension to develop.

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626.00 INSTALLATION SPECIFICATION —RPE® GEOMEMBRANE

Add the following new section:

626.01 SCOPE

A. The work covered by this specification consists of the supply (and installation) of an RPE geomembrane at the locations shown on the drawings (as directed by the Engineer).

B. The supply (and installation) of this liner shall be in accordance with the following references:

1. ASTM D751-89, Standard Test Methods for Coated Fabrics.

2. ASTM D3020-89, Standard Specification for Polyethylene and Ethylene Copolymer Plastic Sheeting for Pond, Canal, an Reservoir Lining.

3. ASTM D4545-86(91), Standard Practice for Determining the Integrity of Factory Seams Used in Joining Manufactured Flexible Sheet Geomembranes.

626.02 MATERIAL CHARACTERISTICS

A. The sheeting shall be suitably formulated from first quality polyethylene materials. The geomembrane shall consist of a high strength, oriented-tape HDPE scrim coated on both sides with an impervious HDPE coating for OR RPE 25. RPE materials prepared for temporary covers or other exposed application will have UV stabilizers added to the impervious coating and UV stabilizers added to the scrim tapes. The RPE material shall be pigmented to produce a uniform color such as black, blue, or silver.

B. The sheeting shall be capable of being sealed to itself using a stitched "Z" fold or heat-sealing technique.

C. The sheeting shall be supplied in the widest widths possible to minimize fabrication seaming. Roll widths shall be not less than 3.5 m.

626.02.01 Manufacturer's Statement

Upon request, the manufacturer of the RPE sheeting shall submit a certification that the material meets the manufacturer's specifications. Material index quality control tests shall be performed a minimum of every 18,000 kg (40,000 lbs), once per shift, or at the start of a new material run.

626.02.02 Material Properties

The geomembrane shall be OR RPE 25 as supplied by Layfield Plastics or an approved equal. The geomembrane shall conform to the manufacturer's material properties table. All values are Typical Values unless otherwise noted.

626.02.03 Warranty

A. Contractor shall provide Owner with a warranty guaranteeing a minimum of three year satisfactory liner performance from defects and UV-degradation.

626.03 FABRICATION

A. On all projects larger than 20,000 m^2 (200,000 ft^2), submit a panel layout in accordance with the project submittal requirements. On the panel layout, indicate the proposed arrangement of panels, fabricated seam orientation, field seam location, and anchor trench locations.

B. Individual roll widths of RPE shall be fabricated into large panels to minimize field seaming. All fabrication welds shall be a minimum of 25 mm (1 inch) wide. Heat welding techniques shall be used for shop fabrication such that all shop welds will provide a delamination of the coating from the scrim when tested. Peel testing will meet the requirements for a "Film Tear Bond" (FTB) Peel Adhesion. The minimum FTB rating shall be AD-DEL.

C. Fabrication welding shall be tested for Bonded Seam strength at a rate of three samples for every 915 lineal meters (3,000 ft) of welded seam. At the fabricator's option, one sample may be taken from each 300 lineal meters (1,000 ft) of welded seam or every 5 shop seams (whichever is greater). Seam samples will be tested for shear strength. Fabricated seam strengths shall conform to the shop seam strength values. Seams samples shall also be qualitatively tested for peel adhesion with a Film Tear Bond rating being obtained on all seams. Seams that do not meet the strength or FTB criteria are to be repaired and retested.

D. Fabricated panels shall be accordion folded in one direction and neatly rolled in the other. Each panel shall be protected with an opaque, weather resistant covering and marked with panel dimensions and unfolding directions. All panels shall be delivered and stored in a protected area until ready for installation.

626.03.01 Installation

A. Prepared surfaces shall be smooth and free of sharp objects, rocks, and organics (roots). A 10 ounce geotextile shall be placed under the liner in all areas.

B. Installation shall be performed in a logical sequence by an installer/contractor experienced in lining installations.

C. Place panels according to the drawings and the panel layout. Sufficient thermal slack shall be incorporated during placement to ensure that harmful stresses do not occur in service. Distribute slack wrinkles evenly.

D. All field seams shall be tightly bonded using tape seaming technology. Six inch wide polyisobutylene-butyl sealant tape shall be used at penetrations and for all field seams.

E. Full contact between the tape and the material will be the standard of acceptance.

F. All field seams shall be non-destructively tested along their entire length using the Air Lance Test (ASTM D4545) or the Mechanical Point Stress Test (ASTM D4545). Patches and seams around pipe penetrations and fitments shall be tested using the Point Stress Test (ASTM D4545). All discontinuities detected by any test method shall be repaired.

G. Repairs shall utilize the same material as the geomembrane, or a material compatible with the geomembrane, and shall extend a minimum of 300 mm (12 inches) beyond the defect. Repairs shall be accomplished with tape seaming techniques utilizing a tape appropriate to existing site conditions. All repairs are to be tested using Air Lance or Mechanical Point Stress methods as applicable (ASTM D4545).

H. Protect the geomembrane from wind uplift during installation through the use of sand bags or other suitable weights. Backfill anchor trenches and place design backfill on geomembrane as soon as practical. Placement of backfill should be monitored continuously, and any damaged areas repaired and tested.

I. Shingle RPE seams in the direction of water flow as applicable. If possible, backfill in the direction of flow to prevent application of stresses to field seams.

J. Pipe Boots. Fit and seal pipes, manholes, and other penetrations of the geomembrane with shop fabricated boots as shown on the Drawings. Match the flange portion of the boot to the angle of the slope or bottom where the pipe or manhole enters the liner for a smooth fit without excess stretching of the material.

627.00 SOIL AMENDMENTS, SEEDBED PREPARATION, AND SEED MIX

Add the following new section.

627.01.1 Soil Amendments, Seedbed Preparation, And Seed Mix

A. Topsoiling. Topsoil shall cover all embankment, backfill, site grading and exposed cut slope areas in accordance with Standard Specification 610. Application rates shall be a minimum of 4 inches at all sites unless otherwise designated in the specifications or on the Drawings.

B. Seedbed Preparation. After the project site has been graded to final plan specifications the site to be seeded shall be cultivated to provide a uniform seedbed surface. The seedbed shall be cultivated sufficiently to reduce the soil to a state of good tilth when the soil particles on the surface are small enough to lie closely enough together to prevent the seed from being covered too deeply for optimum germination. Prior to executing the seeding, fertilizing, and mulching work items, the seedbed at all sites shall be prepared and conditioned so these items can most efficiently be completed in conformance with Standard

Specification 610. The seeding, fertilizing, and mulching work items shall be executed only after the seedbed has been accepted by the Engineer.

C. Seeding and Fertilizing. All areas at the sites disturbed in the execution of the work shall be seeded and fertilized. These areas include that acreage disturbed under the designated work items.

Other areas which are disturbed by the Contractor's operation, will also require seeding and fertilizing. Any such disturbed areas will be considered as site damage and will not be measured or considered for payment. The cost of this work shall be absorbed solely by the Contractor.

All disturbed areas shall be seeded with the designated Grass Mix. Two mixes are provided. One mix is for use on land designated for return to agricultural use and the other applies to all other disturbed areas.

The Contractor shall accomplish this work in accordance with the Fertilizing and Seeding Subsection and the Mulching Subsection of Standard Specification 610, and also in accordance with the provisions contained herein.

1. Fertilizer. Fertilizer shall be applied at the rates specified below. Exceptions will be made for seed drills that are capable of incorporating the fertilizer and seed directly into the seedbed uniformly at the specified rates. Fertilizer shall be applied to the prepared seedbed prior to seeding or mulching and shall be blended with the topsoil as called for in Standard Specification 610, or concurrently with the seed (as "no till" drills allow).

   Fertilizer shall be applied to the prepared seedbed prior to seeding. The fertilizer shall be incorporated into the soil by discing, raking, or shallow plowing to the full depth of the topsoil or to a maximum depth of 6 inches, whichever is less. Fertilizer shall be incorporated with equipment operated at right angles to the slope of the land.

   All areas, except areas that will be returned to agricultural production within one year of project completion, shall be fertilized with a balanced inorganic chemical fertilizer with the following nutrients:

   Composition 26-10-5 150 lbs/acre

   All required fertilizer certificates shall be provided to the Engineer a minimum of three days prior to fertilizing. The certification shall include the guaranteed analysis of the fertilizer(s) stated in terms of the percentages of nitrogen (N), available phosphorus (P205) and potash (K20) in that order. The fertilizer specification may be changed by the Owner to a fertilizer mix based on specific site soil samples at no cost to the Owner.

2. Seed Certification. Seed certifications as required by Standard Specification 610 shall be submitted to the Engineer prior to any seeding. The Contractor shall also submit a copy of the bill or other documentation from the seed supplier showing actual bulk weights of the individual seed types combined in the mix. The required certifications and documentation shall be provided to the Engineer at least three days prior to seeding.

3. Seeding. The following application rates for seed are based on the drill seeding method. The seed mixture shall be uniformly distributed over the areas shown on project plans. All planting shall be done between October 15 and May 20 of a given year, except as specified in writing by the Owner. Seed shall be drilled at a depth of 1/2 inch utilizing a pasture or rangeland type drill (including custom seeders, furrow drills, disc drills or no-till drills) with a roller/cultipacker integral to the seed drill equipment. Broadcast seeding method will not be utilized on this project. Hydraulic seeding will be allowed only on areas too steep for drill seeding. Where the hydraulic seeding method is used, the application rates listed below must be doubled at no additional cost to the Owner.

4. Tracking. Tracking will be required only on areas where mulch tilling cannot be accomplished.

DISTURBED AREAS DESIGNATED FOR RETURN TO AGRICULTURAL PRODUCTION

Common Name	Scientific Name	Variety	Seed Application Rate (PLS lbs/acre)[1]
Regreen	Triticum x Elytrigia	---	30
Total seeded species (PLS lbs/acre)[1]			30

[1] PLS (Pure Live Seed) seeding rate is based on drill seed application. PLS seeding rate will be doubled for broadcast or hydroseeded applications.

DISTURBED AREAS NOT DESIGNATED FOR RETURN TO AGRICULTURAL PRODUCTION

Common Name	Scientific Name	Variety	Seed Application Rate (PLS lbs/acre)[1]
Streambank wheatgrass	Agropyron riparium	Sodar	2
Pubescent wheatgrass	Agropyron dasystachyum	Critana	2
Western wheatgrass	Agropyron smithii	Rosana	3
Bluebunch wheatgrass	Agropyron spicatum	Secar	3
Crested wheatgrass	Agropyron cristatum	Ephraim	2
Sideoats grama	Bouteloua curtipendula	Pierre	3
Regreen	Triticum x Elytrigia	---	10
Cicer milkvetch	Astragalus cicer	---	5
Total seeded species (PLS lbs/acre)[1]			30

[1] PLS (Pure Live Seed) seeding rate is based on drill seed application. PLS seeding rate will be doubled for broadcast or hydroseeded applications.

D. Tackifier. Tackifier shall be applied with all hydromulched areas at the manufacturer's recommended rate of forty (40) pounds per acre for slopes flatter than 2:1 and eighty (80) pounds per acre for slopes 2:1 or steeper.

1. Summer Erosion Control Procedure. In the event the construction is completed after April 30 but before October 15, the disturbed areas shall then be either mulched immediately with a vegetative mulch of straw or hay, applied at a rate of 4,000 pounds per acre or a soil stabilizer applied at the manufacturer's recommendation with a hydroseeder. The mulch shall be anchored into the seedbed as specified in Standard Specification 610.

   A "no-till" drill with "no-till" coulters may be used to seed and fertilize directly into the mulched areas requiring permanent seeding after the October 15 date. After October 15, fertilizer shall be applied to the work areas at the application rate noted and incorporated into the soil as specified in Standard Specification 610. Seed shall then be applied by drilling methods only.

END OF DOCUMENT

DIVISION 700 - MATERIALS

SECTION 708 – CONCRETE, PLASTIC, AND FIBER PIPE

(Add the following new subsection.)

708.08 POLYETHYLENE SMOOTH WALL PIPE

Furnish smooth wall polyethylene pipe meeting ASTM F714, DR 21 for pipes 75 to 600 mm (3 to 24 inches), and SDR 26 for pipes 650 to 1200 mm (26 to 48 inches). Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class 335434C.

SECTION 716 - FLOWABLE FILL

(Add the following subsection.)

716.01 GENERAL

This section covers furnishing and placing of flowable fill. Flowable fill shall be placed in utilities as specified on drawings.

716.02 MATERIALS

Control Density Fill - (CDF) is used as a low strength, self consolidating fill material for confined spaces which can be easily excavatable at a later time. CDF is characterized by a high maximum slump of 8 inches. CDF is not a structural concrete and should not be used in such applications. CDF may be used as a trench backfill, structural backfill, pipe bedding, or pipe filling for abandonment in place. CDF shall consist of Portland cement, aggregates, water and fly ash. Chemical admixtures and other mineral admixtures may be used. The actual mix proportions and flow characteristics shall be determined by the producer of the CDF to meet site conditions. Mix designs and performance tests shall be submitted to the Engineer for approval.

Portland Cement

Portland cement shall conform to the requirements of ASTM C150, Type I or Type II.

Aggregates

The aggregates shall conform to the requirements of ASTM C33. The amount of material passing the #200 sieve shall not exceed 15 percent. Also, liquid limit and plasticity index shall not exceed 25 and 5, respectively.

Chemical Admixtures

Chemical admixtures shall conform to the requirements of ASTM C494.

Water

Water shall be free of oils, acids, alkalies, organic matter or other deleterious substances.

Fly Ash

Fly ash shall conform to the requirements of ASTM C618, Class C or F.

The contractor will perform occasional quality assurance tests on the flowable fill consisting of casting three cylinders for comprehensive strength testing. The required minimum compressive strength value at 28 day age is 200 psi. Compressive strength test specimens are to be cast according to ASTM C31, and tested according to ASTM C39.

The Contractor will provide the Contracting officer with a mix design from a testing laboratory generally conforming to the requirements of ASTM E329 within 15 days after Notice to Proceed. Mix design strengths at 7 and 14 days shall also be reported within 3 days after the test is taken.

716.03 EXECUTION

General Requirements

Plug and abandonment of the site underground utilities will occur as site cleaning and demolition activities are completed but before grading and capping activities begin.

Comply with ASTM C94 for Measuring, Mixing, Transporting, and Placing the Flowable Fill, and as herein specified.

Mix and place Flowable Fill only when the air temperature is at least 35 degrees F and rising. At the time of placement, Flowable Fill shall be at least 40 degrees F. Stop mixing and placement when the air temperature is 40 degrees and falling.

Flowable Fill shall be placed by methods that preserve the quality of the material in terms of compressive strength, flow, homogeneity, plasticity and workability. The material shall be transported, placed, and/or consolidated so that it flows easily through all utility corridors and pipes. It shall have the flow, consistency, and workability such that the material is self-compacting.

Protect freshly placed Flowable Fill from premature drying, excessive cold, or hot temperatures. The air in contact with the backfill surface shall be maintained at temperatures above freezing.

Plug and Abandonment Prior to Backfill, Grading, and Capping

All underground utilities underlying temporary capping areas will be plugged and abandoned prior to backfill, grading, and capping activities.

Pipe Segments – Designated pipe segments, which include manholes and small vaults, shall be plugged with Flowable Fill. Plugging shall begin at the down gradient location, such as a manhole or small vault, and proceed upgradient to ensure effective filling of the conduit.

END OF DOCUMENT

2009 CLEANING AND DEMOLITION PROGRAM
AND
2009 INTERIM MEASURES WORK PLAN ADDENDUM

ASARCO EAST HELENA PLANT

APPENDIX D

March 2009

EXAMPLE INSPECTION FORM

INTERIM CAP INSPECTION CHECKLIST

AREA INSPECTED	Area No.		Inspected by:	DATE:		
	ITEM NO.	CONDITION	OBSERVATION	ACTION NEEDED		
				MONITOR	INVESTIGATE	REPAIR
INTERIM LINER SYSTEMS	1	Exposed liner				
	2	Sand Bags				
	3	Liner Seams				
	4	Liner/Concrete Attachments				
	5	Site Drainage				
Additional Comments:						

ASARCO LLC - EAST HELENA PLANT

2009 WORK PLAN

MARCH, 2009

LEGEND

- 2009 WORK PLAN
- 2008 AND PRIOR WORK
- DETAIL NUMBER (X / Y)
- PAGE ON WHICH DETAIL IS SHOWN

ABBREVIATIONS

B.F.	BLAST FURNACE
BLDG.	BUILDING
CONC	CONCRETE
CONV.	CONVEYOR
CY	CUBIC YARDS
Ø	DIAMETER
EL., ELEV.	ELEVATION
EX., EXIST.	EXISTING
FCE.	FURNACE
I.E.	INVERT ELEVATION
LF	LINEAL FOOT
LIQ.	LIQUID
M.C.C.	MOTOR CONTROL CENTER
MISC.	MISCELLANEOUS
MPC	NORTHWEST ENERGY
MW	MONITORING WELL
N.G.	NATURAL GAS
OC	ON CENTER
PB	LEAD BEARING MATERIAL
R, RAD.	RADIUS
SCH, SCHED.	SCHEDULE
SY	SQUARE YARDS
TYP.	TYPICAL
V	VERTICAL
W, WTR.	WATER
W/	WITH

DRAWING LIST

REVISIONS	NO	BY	DATE	DESCRIPTION

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

Project No.: 9006

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CHECKED BY		
APPROVED BY		
SCALE: AS NOTED		

Hydrometrics, Inc.
Consulting Scientists and Engineers
Helena, Montana 59601
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ASARCO LLC - EAST HELENA PLANT
2009 WORK PLAN

DRAWING INDEX AND SITE VICINITY MAP

DRAWING FILE NUMBER: 900601H012
AUTOCAD 2004 DRAWING (DWG)
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